



STROKE SPECIAL INTEREST GROUP

Academy of Neurologic Physical Therapy

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STROKE SIG
ARTICLE REVIEW
Academy of Neurologic Physical Therapy



You can either read below, or listen to the audio version with this [LINK](#)

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Thank you, Niya!

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Summary topic title: Vagus Nerve Stimulation Paired with Rehabilitation for Upper Limb Motor Function After Ischaemic Stroke (VNS-REHAB): A Randomized, Blinded, Pivotal, Device Trial

Article reference: Dawson J, Liu CY, Francisco GE, et al. Vagus nerve stimulation paired with rehabilitation for upper limb motor function after ischaemic stroke (VNS-REHAB): a randomised, blinded, pivotal, device trial. *Lancet*. 2021;397(10284):1545-1553. doi:10.1016/S0140-6736(21)00475-X

Link to full

article: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8862193/pdf/nihms-1779054.pdf>

Definitions:

Vagus Nerve Stimulation (VNS): A novel treatment approach to enhance upper limb

(UE) recovery after stroke. VNS attempts, through a device implanted in the neck, to improve reorganization potential of the brain through cholinergic and monoaminergic modulation of the motor cortex neurons. This modulation is paired with motor training/sensory input and has successfully reorganized cortical neurons in rats. Supratentorial: Upper parts of the brain including cerebrum, lateral, and third ventricle, choroid plexus, hypothalamus, pineal gland, pituitary gland, and optic nerve.

Abbreviations: Fugl-Meyer Assessment Upper Extremity (FMA-UE), Wolf-Motor Function Test (WMFT)

Purpose of article: It is common for patients to have long-term loss of arm function after an ischemic stroke. The purpose of this article is to determine whether VNS treatment, when combined with movement training, can be effective and safe for improving arm function after stroke.

Methods of interest: 108 adult participants with supratentorial ischemic stroke (occurring between 9 months to 10 years prior to enrollment) and moderate to severe arm weakness (FMA UE score 20-50) were included in the study. Initially, all participants underwent VNS device implantation and were randomized to receive active VNS or control VNS with upper limb rehabilitation. The stimulation provided was tested in increments of 0.1 mA to ensure tolerance. Both groups received in-clinic therapy (3 times per week) for 6 weeks followed by home-based therapy for 3 more months. In-clinic therapy consisted of high repetition, task-based (reach and grasp, gross movement, opening/closing containers, etc.), functional, individualized, and progressive upper limb exercises. The movement direction, object, and environmental factors of exercises were adjusted to maintain appropriate difficulty level. Six tasks were performed in the same order with about 30-50 repetitions for each task. The therapist timed the VNS pulse (about 0.8 mA, 100 μ s, 30 Hz for 0.5 seconds) with each repetition and a sham pulse was set for patients in the control group. Following in-clinic therapy, all participants began daily home exercises for 3 months. The home therapy session lasted 30 minutes and included tasks following the same principles as the in-clinic therapy. During home exercises, participants activated the VNS device via a single magnet swipe over the device. 30 minutes of either active or sham VNS was then delivered according to the subject's randomized group allocation. The stimulation output current was kept the same as during in-clinic therapy. Outcomes were performed day 1 after device implementation, 30 days after in-clinic therapy, and 90 days after in-clinic therapy. The primary outcome measures were [the FMA-UE and WMFT](#). Additional measures were utilized including Motor Activity Log, Stroke Impact Scale Score, Stroke Specific Quality of Life, EuroQol-5D, and the Beck Depression Inventory.

Results of interest: The primary outcome (change in FMA-UE score from baseline to the first day after in-clinic therapy) was significantly higher in the VNS group than the Control group (VNS: 5.0, SD 4.4, Control: 2.4, SD 3.8). A clinically meaningful response on the FMA-UE score occurred in more participants in the VNS group compared to the control group at day 90 following completion of in-clinic therapy (47% versus 24%). The WMFT-functional score was also significantly increased in the VNS group compared to the control group at 90 days after the end of in-clinic therapy (VNS: 0.46, SD 0.40, Control: 0.16, SD 0.30). A total of 334 adverse events were reported in 85 (78%) participants. The majority of these were mild and were mostly due to post-operative pain. For tertiary outcomes (QoL measures), there was a numerically greater difference between baseline and follow-up in the VNS group than in the control group.

Discussion, take home message: Patients that receive VNS paired with rehabilitation

can significantly improve UE outcomes as demonstrated by scores on the FMA-UE and WMFT. Patients in the active VNS group were about twice as likely to obtain scores reaching minimally clinically important differences compared to those in the control group. Small improvements were made in the control group as well, but improvements were about 2-3 times greater in multiple measures for patients in the active VNS group.

Additional references:

FMA-UE: https://www.sralab.org/sites/default/files/2017-07/1520603_fma-ue-protocol-english-updated-20150311.pdf

Wolf Motor Functional Test: <https://www.sralab.org/rehabilitation-measures/wolf-motor-function-test>

Mayo Clinic: Vagus Nerve Stimulation <https://www.mayoclinic.org/tests-procedures/vagus-nerve-stimulation/about/pac-20384565>

Be sure to check out
ANPT Practice Committee Update
(From the APTA)

Landmark Report on the Economic Value of Physical Therapy in the United States

The results show that the suite of physical therapist services investigated were clinically effective and delivered net economic benefits, with improvements in patients' quality of life exceeding the net cost of the care delivered.

- Check out this [video](#) highlighting the report and the support campaign
- Take a look at the [website](#) for all campaign resources

2023 ANPT Annual Conference On-Demand Content Available Now!

ANPT Annual Conference On-Demand content is available! Registration will close on **November 26th**.

The On-Demand registration includes:

- Interactive profile to connect with fellow on-demand attendees.
- 10 education sessions that may be worth up to 20 contact hours or 2.0 CEUs.
- Online Poster Hall

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