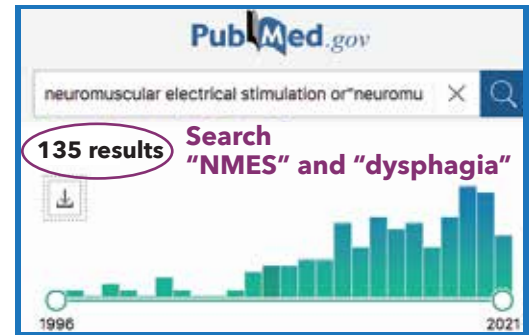


NMES in the Treatment of Dysphagia: The Facts

#1 | NMES FOR DYSPHAGIA IS EVIDENCE BASED

- **Over 100** studies published and indexed
- Most studies published were in the last 10 years
- Research is ongoing
- **>95 percent** of studies disclose no conflicts of interest (i.e., no funding from industry, authors independent)
- **6** meta-analysis to date⁽¹⁻⁶⁾



pubmed.ncbi.nlm.nih.gov 7/17/21; search term "nmes or "neuromuscular electrical stimulation" and dysphagia"

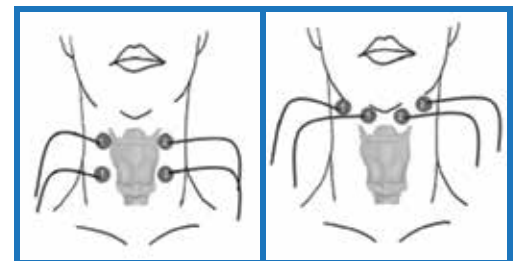
#2 | NMES FOR DYSPHAGIA IS SAFE *

- **No adverse events** reported in the literature or to FDA in over 18 years of worldwide clinical use and well over 3 million treatments
- Electrodes placement combinations that include electrodes below the hyoid bone **DO NOT increase risk**.
- **Best practice:** deliver electrical stimulation by trained clinician in conjunction with active exercise therapy



#3 | PLACING ELECTRODES ABOVE AND BELOW THE HYOID IS SAFE*

- Early concern that infrahyoid muscles may negatively impact swallowing performance^(7,8) **is not supported by research findings^(9,10)** and absence of adverse events
- Possible explanation: perturbation training, i.e., motor response of infra- and/or suprahyoid muscles interferes with physiological swallow effort causing central nervous system to increase gain ("try harder")^(9,11)
- Sensory stimulation is likely to be a significant contributor to reported positive outcomes⁽¹²⁾ - electrodes below the hyoid expand the field of sensory stimulation



1. Chen, Yi-Wen, et al. "The effects of surface neuromuscular electrical stimulation on post-stroke dysphagia: a systemic review and meta-analysis." *Clinical rehabilitation* 30.1 (2016): 24-35.
2. Sun, Yuan, et al. "Effects of transcutaneous neuromuscular electrical stimulation on swallowing disorders: a systematic review and meta-analysis." *American journal of physical medicine & rehabilitation* 99.8 (2020): 701.
3. Chiang, Ching-Fang, et al. "Comparative efficacy of noninvasive neurostimulation therapies for acute and subacute poststroke dysphagia: a systematic review and network meta-analysis." *Archives of physical medicine and rehabilitation* 100.4 (2019): 739-750.
4. Carnaby-Mann, Giselle D., and Michael A. Crary. "Examining the evidence on neuromuscular electrical stimulation for swallowing: a meta-analysis." *Archives of Otolaryngology-Head & Neck Surgery* 133.6 (2007): 564-571.
5. Tan, C., et al. "Transcutaneous neuromuscular electrical stimulation can improve swallowing function in patients with dysphagia caused by non-stroke diseases: a meta-analysis." *Journal of oral rehabilitation* 40.6 (2013): 472-480.
6. Alamer, Abayneh, Haimanot Melese, and Fetene Nigusie. "Effectiveness of neuromuscular electrical stimulation on post-stroke dysphagia: a systematic review of randomized controlled trials." *Clinical Interventions in Aging* 15 (2020): 1521.
7. Ludlow, Christy L., et al. "Effects of surface electrical stimulation both at rest and during swallowing in chronic pharyngeal dysphagia." *Dysphagia* 22.1 (2007): 1-10.
8. Humbert, lanessa A., et al. "The effect of surface electrical stimulation on hyolaryngeal movement in normal individuals at rest and during swallowing." *Journal of Applied Physiology* 101.6 (2006): 1657-1663.
9. Humbert, lanessa A., et al. "Human hyolaryngeal movements show adaptive motor learning during swallowing." *Dysphagia* 28.2 (2013): 139-145.
10. Park, Jin-Woo, et al. "Effortful swallowing training coupled with electrical stimulation leads to an increase in hyoid elevation during swallowing." *Dysphagia* 24.3 (2009): 296-301.
11. Watts, Christopher R., and Matthew J. Dumican. "The effect of transcutaneous neuromuscular electrical stimulation on laryngeal vestibule closure timing in swallowing." *BMC Ear, Nose and Throat Disorders* 18.1 (2018): 1-7.
12. Arreola, Viridiana, et al. "Effect of Transcutaneous Electrical Stimulation in Chronic Poststroke Patients with Oropharyngeal Dysphagia: 1-Year Results of a Randomized Controlled Trial." *Neurorehabilitation and Neural Repair* (2021): 15459683211023187.
13. Nussbaum, Ethne L., et al. "Neuromuscular electrical stimulation for treatment of muscle impairment: critical review and recommendations for clinical practice." *Physiotherapy Canada* 69.5 (2017): 1-76.

*"Safety" refers ONLY to those dysphagia therapists who have been trained in the safe use of NMES for dysphagia.