

## NMES and sEMG Research

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The following published articles provide a sample of the research available to demonstrate the efficacy of NMES and sEMG in dysphagia treatment:

### **Neuromuscular Electrical Stimulation:**

[Talal N, Quinn JH, Daniels TE. The clinical effects of electrostimulation on salivary function of Sjögren's syndrome patients. A placebo controlled study. Rheumatol Int. 1992;12\(2\):43-5.](#)

[Miller S, Kühn D, Jungheim M, Schwemmler C, Ptak M. \[Neuromuscular electric stimulation therapy in otorhinolaryngology\]. HNO. 2014 Feb;62\(2\):131-8; quiz 139-40. doi: 10.1007/s00106-013-2810-4. Review. German.](#)

[Palmer PM, Luschei ES, Jaffe D, McCulloch TM. Contributions of individual muscles to the submental surface electromyogram during swallowing. J Speech Lang Hear Res. 1999;42\(6\):1378-91.](#)

[Kim SJ, Han TR. Effect of surface electrical stimulation of suprahyoid muscles on hyolaryngeal movement. Neuromodulation. 2009 Apr;12\(2\):134-40. doi:10.1111/j.1525-1403.2009.00200.x. PubMed PMID: 22151287.](#)

[Toyama K, Matsumoto S, Kurasawa M, Setoguchi H, Noma T, Takenaka K, Soeda A, Shimodozono M, Kawahira K. Novel neuromuscular electrical stimulation system for treatment of dysphagia after brain injury. Neurol Med Chir \(Tokyo\). 2014;54\(7\):521-8. Epub 2014 Mar 27. PubMed PMID: 24670314; PubMed Central PMCID: PMC4533457.](#)

[Park JW, Kim Y, Oh JC, Lee HJ. Effortful swallowing training combined with electrical stimulation in post-stroke dysphagia: a randomized controlled study. Dysphagia. 2012 Dec;27\(4\):521-7. doi: 10.1007/s00455-012-9403-3. Epub 2012 Mar 24. PubMed PMID: 22447240.](#)

### **Neuroplasticity and Cortical Remapping:**

[Translating Principles of Neural Plasticity Into Clinically Oriented Evidence. Robbins et al. \(2008\). Journal of Speech, Language and Hearing Research. 51, s276-s300.](#)

[Kleim, J. A. & Jones, T. A. \(2008\). Principles of Experience-Dependent Neural Plasticity: Implications for Rehabilitation After Brain Damage. J Speech Lang Hear Res, 51\(1\), S225-S239. doi: 10.1044/1092-4388\(2008/018\).](#)

[Oh BM, Kim DY, Paik NJ. Recovery of swallowing function is accompanied by the expansion of the cortical map. Int J Neurosci. 2007 Sep;117\(9\):1215-27.](#)

**sEMG:**

Cram, Jeffrey R. (1990) *Clinical EMG for Surface Recordings, Volume 2*. City, state: Clinical Resources.

[Ashida I, Iwamori, H., Kawakami, S-Y., Miyaoka, Y., Murayama, \(2010\). Analysis of the pattern of suprahyoid muscle activity during pharyngeal swallowing of foods by healthy young subjects, Journal of Medical Engineering & Technology, 34 \(4\), 268-273](#)

[Vaiman, Micheal \(2007\). Standardization of surface electromyography utilized to evaluate patients with dysphagia, Head & Face Medicine, 3 \(26\).](#)

[Zhang J, Li JR, Chen DL. \[Surface electromyographic study on swallowing in normal adults\]. Zhonghua Er Bi Yan Hou Tou Jing Wai Ke Za Zhi. 2013 Jun;48\(6\):445-9. Chinese. PubMed PMID: 24103164.](#)