

Publications on Tong Stimulation

First discovery of retention effects after tongue stimulation

Tyler, M., Danilov Y.P., Bach-y-Rita, P. Closing an open-loop control system: vestibular substitution through the tongue. *J. Integr. Neurosci.* 2, 2, 2003

2004

First description of multiple positive effects of tongue stimulation

Yuri Danilov. Vestibular substitution for posture control, In.: Innovations technologiques et Handicap, Actes des Entretiens de l'Institut Garches, eds: F. Lofaso, JF Ravaud et A. Roby-Brami, Frison-Roche, Paris, 2004, pp. 216-225

2005

Summary and perspective vision of use tongue stimulation in rehabilitation

Bach-y-Rita P, Danilov YP, Tyler ME, Grimm RJ. Late Human Brain Plasticity: Vestibular Substitution with a Tongue BrainPort Human-Machine Interface. *J Intellectica.* 2005, 40, pp. 115-122.

First two TBI patients demonstrate remarkable improvement after 2 weeks of training, at Chateau Rauzé Rehabilitation centre (specialized exclusively in the treatment of TBI) at Cénac near Bordeaux France._

PET scan study demonstrate rearrangement of brain activity after tongue stimulation in blind subjects

Ptito, Maurice, et al. "Cross-modal plasticity revealed by electrotactile stimulation of the tongue in the congenitally blind." *Brain* 128.3 (2005): 606-614._

2007

First 28 patients with vestibular loss

Danilov Y. P., Skinner K. L., Tyler M. E., Bach-y-Rita P. Efficacy of electrotactile vestibular substitution in patients with bilateral vestibular and central balance loss, *JOVR*, 2007, 17, 119-130

2008

Independent verification in France, 8 vestibular los patients

Nicolas Vuillerme , Nicolas Pinsault, Olivier Chenua, Jacques Demongeota, Yohan

Payan , Yuri Danilov. Sensory supplementation system based on electrotactile tongue biofeedback of head position for balance control, *Neuroscience Letters*, 431, 3 (2008) 206-10

2009

The first textbook chapter about vestibular substitution

Danilov, Y. P., Tyler, M. E. and Kaczmarek, K. A. (2008). Vestibular sensory substitution using tongue electrotactile display. In *Human Haptic Perception: Basics and Applications* (Grunwald, M., Ed.), Birkhauser Verlag, Basel, Switzerland. (invited review), Chapter 39, pp. 467-480

2010

First independent objective verification of tongue stimulation effects using fMRI

Wildenberg, J.C., Tyler, M.E., Danilov, Y.P., Kaczmarek, K.A., Meyerand, M.E. (2010) Sustained cortical and subcortical neuromodulation induced by electrical tongue stimulation. *Brain Imaging and Behavior*.

Independent verification in Brasil

Barros, C.G., Bittar, R.S., Danilov Y. Effects of electrotactile vestibular substitution on rehabilitation of patients with bilateral vestibular loss, *Neuroscience Letters*, 476, 3 (2010) 123-6

2011

UW-Madison, fMRI verification continued

Joseph C. Wildenberg, Mitchell E. Tyler, Yuri P. Danilov, Kurt A. Kaczmarek, Mary E. Meyerand. Electrical tongue stimulation normalizes activity within the motion-sensitive brain network in balance-impaired subjects as revealed by group-ICA. (2011). *Brain Connectivity*.

Joseph C. Wildenberg, Mitchell E. Tyler, Yuri P. Danilov, Kurt A. Kaczmarek, Mary E. Meyerand. High-resolution fMRI detects neuromodulation of individual brainstem nuclei by electrical tongue stimulation in balance-impaired individuals (2011). *Neuroimage* 56, pp. 2129-2137

Joe C. Wildenberg, Mitchell E. Tyler, Yuri P. Danilov, Kurt A. Kaczmarek, and Mary E. Meyerand. Altered Connectivity of the Balance Processing Network After Tongue Stimulation in Balance-Impaired Individuals. *Brain Connectivity*, 3,1, (2013), 87-97.

First use of tongue stimulation for stroke patients

Badke MB, Sherman J, Boyne P, Page S, Dunning K. Tongue-based biofeedback for balance in stroke: results of an 8-week pilot study. Arch Phys Med Rehabil 2011;92:1364-70.

2014

First controlled study with MS patients, UW-Madison

Tyler, ME, Kaczmarek, KA, Rust KL, Subbotin AM, Skinner, KL, Danilov, YP. (2014) Non-invasive neuromodulation to improve gait in chronic multiple sclerosis: a randomized double blind controlled pilot trial. Journal of NeuroEngineering and Rehabilitation, 11:79.

Feasibility study on spinal cord injury subjects (SCI), Canada

Chisholm, Amanda E., et al. "Feasibility of sensory tongue stimulation combined with task-specific therapy in people with spinal cord injury: a case study." Journal of neuroengineering and rehabilitation 11.1 (2014): 96.

First use TLNS in pediatric population, Omaha, Nebraska, USA

Harbourne, Regina, et al. "Improving the motor skill of children with posterior fossa syndrome: a case series." Pediatric Physical Therapy 26.4 (2014): 462-468.

2015

Conceptual summary of tongue stimulation use for neurorehabilitation, UW-Madison

Danilov, Y., K. Kaczmarek, K. Skinner and M. Tyler (2015). Cranial nerve noninvasive neuromodulation: New approach to neurorehabilitation. Chapter 44. In: Brain neurotrauma: Molecular, neuropsychological, and rehabilitation aspects. F. H. Kobeissy and S. W. Hoffman, CRC Press: 603-628

2016

First paper about tongue stimulation in neurorehabilitation of CP children, Russia

Ignatova, T.S., Scoromets, A.P., Kolbin, V.E., Sarana, A.M., Sherbak, S.G., Makarenko, S.V., Deineko, V.V., Danilov, Y.P. (2016) Translingual Brain Neurostimulation In Treatment Of The Pediatric Cerebral Palsy. Journal of restorative medicine and rehabilitation, 6, pp.10-16.

2017

Description of effects on cognitive functions, UW-Madison

Paltin, D., Tyler, M., Danilov, Y. Cognitive enhancement exciting discovery using translingual neuro-stimulation. (2017) J Neurol Neurorehabil Res, 2, 1, 39-45

Book chapter about TBI rehabilitation, UW-Madison

Yuri Danilov, Dafna Paltin. Translingual Neurostimulation (TLNS) -- Perspective on a Novel Approach to Neurorehabilitation After Brain Injury (2017). Chapter X.

Effects on stroke patients, Australia

Galea, Mary P., et al. "Cranial nerve non-invasive neuromodulation improves gait and balance in stroke survivors: a pilot randomised controlled trial." Brain Stimulation: Basic, Translational, and Clinical Research in Neuromodulation 10.6 (2017): 1133-1135.

Independent objective fMRI based verification on MS subjects, Montreal, Canada

Leonard, Gabriel, et al. "Noninvasive tongue stimulation combined with intensive cognitive and physical rehabilitation induces neuroplastic changes in patients with multiple sclerosis: a multimodal neuroimaging study." Multiple Sclerosis Journal—Experimental, Translational and Clinical 3.1 (2017): 2055217317690561.

2018

fMRI verification on CP subjects, Russia

Ignatova, T. S., et al. "Translingual Neurostimulation in Treatment of Children with Cerebral Palsy in the Late Residual Stage. Case Study." BIOSIGNALS. 2018.

Benefits for stroke patients, UW-Madison

Paltin, Dafna, Yuri P. Danilov, and Mitchell E. Tyler. "DIRECT AND INDIRECT BENEFITS OF TRANSLINGUAL NEUROSTIMULATION TECHNOLOGY FOR NEUROREHABILITATION OF CHRONIC STROKE SYMPTOMS." BRAIN-MACHINE INTERFACES: 69.

2019

EEG based effects TLNS on cognitive processes in normal, Canada

Frehlick, Zack, Bimal Lakhani, Shaun D. Fickling, Ashley C. Livingstone, Yuri Danilov, Jonathan M. Sackier, and Ryan CN D'Arcy. "Human translingual neurostimulation alters resting brain activity in high-density EEG." *Journal of neuroengineering and rehabilitation* 16, no. 1 (2019): 60.

Blind study on TBI subjects, UW-Madison

Tyler, Mitchell, Kim Skinner, Vivek Prabhakaran, Kurt Kaczmarek, and Yuri Danilov. "Translingual neurostimulation for the treatment of chronic symptoms due to mild-to-moderate traumatic brain injury." *Archives of Rehabilitation Research and Clinical Translation* (2019): 100026.