

# Research & Clinical newsletter Recovery Science August 2015

## Neuromuscular Electrical Stimulation

### NMES improves postural control and muscle condition in elderly women

"Neuromuscular electrical stimulation leads to physiological gains enhancing postural balance in the pre-frail elderly."

*Mignardot et al. Jul 2015 Physiological Reports*

- Experimental study on 16 elderly women.
  - NMES group: 9 pre-frail older women living in a long-term care facility
  - Control group: 7 non-trained, non-frail older women living at home
- NMES group received 12 sessions (4 weeks) NMES training of the calf muscles with **COMPEX ENERGY**, while the control group continued with their habitual life without performing any specific physical training
- At baseline, the pre-frail women from the NMES group had significantly lower values on muscle, tendon and postural control tests than the control group.
- 12 sessions NMES training with **COMPEX ENERGY** produced significant improvement of muscle & tendon properties and postural control.
- These improvements are immediately transferable into a functional context.
- The control group showed no significant changes.

**An NMES-based training program improves strength & biomechanical properties of the calf muscle and also postural control in pre-frail elderly women.**

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### NMES is a viable additional treatment option for stroke patients

"Effects of Electrical Stimulation in Spastic Muscles After Stroke: Systematic Review and Meta-Analysis of Randomized Controlled Trials."

*Stein et al. Aug 2015 Stroke*

- Systematic review with meta-analysis including 29 randomized clinical trials / 940 subjects in total.
- NMES provided reductions in spasticity in 14 RCTs and increase in ROM in 13 RCTs when compared with control group after stroke.
- Concerning the stimulation parameters to be used, in this review, the usage of NMES with a frequency between 30 and 50 Hz and a pulse width between 0.1 and 0.5 ms, for 30 minutes, 5 times per week, for 3 to 4 weeks were associated with successful results.

**NMES is a viable additional treatment option for stroke patients providing spasticity relief and ROM improvement**

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## VitalStim improves swallowing function in brain injury

### "Effect of Electrical Stimulation of the Suprahyoid Muscles in Brain-Injured Patients with Dysphagia."

*Beom et al. Aug 2015 Dysphagia*

- Randomised parallel group study including 132 patients with subacute stroke, traumatic brain injury, or brain tumor.
- Patients were randomly allocated to:
  - NMES on the suprahyoid muscles: 2 electrode pairs above the hyoid bone (StimPlus device)
  - NMES on the suprahyoid and infrahyoid muscles: 1 electrode pair above and 1 pair below the hyoid bone (**VitalStim**; electrode placement 2a).
- Functional dysphagia scale (FDS), Swallow function score (SFS), Supraglottic penetration, Subglottic aspiration improved in both groups with no significant difference between groups.

**NMES treatment significantly improves swallowing function in brain-injured patients. There was no difference between suprahyoid only or supra+infrahyoid electrode placement.**

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## NMES promotes peripheral nerve repair

### "Strategies to promote peripheral nerve regeneration: electrical stimulation and/or exercise."

*Gordon et al. Jun 2015 Eur J Neuroscience*

- In this review, the evidence for the efficacy of electrical stimulation (ES), daily exercise, and their combination in promoting nerve regeneration after peripheral nerve injuries in both animal models and in human patients, is explored.

**Both exercise and electrical stimulation are promising treatment modalities for promoting peripheral nerve regeneration.**

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### "Brief electrical stimulation improves nerve regeneration after delayed repair in Sprague Dawley rats."

*Elzinga et al. Jul 2015 Experimental Neurology*

- Experimental laboratory study on rats.
- Common peroneal neurons were chronically axotomized and/or tibial schwann cells and ankle extensor muscles were chronically denervated.
- The CP and TIB nerves were cross-sutured after 3 months and subjected to either sham or 1 hour 20Hz electrical stimulation (ES).
- ES significantly increased the numbers of both motor and sensory neurons that regenerated their axons after a 3 month period.

**20 Hz electrical stimulation promotes nerve regeneration after delayed nerve repair.**

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## NMES improves urinary incontinence in children

"The effectiveness of transcutaneous electrical neural stimulation therapy in patients with urinary incontinence resistant to initial medical treatment or biofeedback."

*Tugtepe et al. Jun 2015 J Pediatr Neurol*

- Prospective study including 27 children with partial or no response to standard treatment.
- TENS (10Hz) was performed parasacral on S3 dermatome, 20 min every day for 3 months.
- Patients' response rates after 3 months of TENS were: complete response in 70.4%, partial response in 22.2% and no response in 7.4%.

TENS is a promising treatment option for standard-treatment refractory children with urinary incontinence

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## NMES and sEMG Biofeedback improve urinary incontinence after prostatectomy

"Recovery of Urinary Continence After Radical Prostatectomy Using Early vs Late Pelvic Floor Electrical Stimulation and Biofeedback-associated Treatment."

*Mariotti et al. July 2015 Urology*

- Prospective study including 120 patients who suffered from urinary incontinence following radical prostatectomy.
- 60 patients were 2 weeks post-surgery (group 1), while 60 patients were 1 year post-surgery (group 2).
- All patients received the same program of 12 sessions sEMG biofeedback + electrical stimulation.
- Urinary leakage improved in both groups, however significantly more in group 1 at short term follow-up.
- 6 months after the beginning of treatment the objective continence rate was 96.7% in group 1 and 91.7% in group 2.

More than 90% of patients were continent 6 months after start of a 6 weeks treatment program combining estim with sEMG BFB.

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## Pain Management - TENS

### Direct and indirect benefits of TENS reported by long term users

"Direct and Indirect Benefits Reported by Users of Transcutaneous Electrical Nerve Stimulation for Chronic Musculoskeletal Pain: Qualitative Exploration Using Patient Interviews."

*Gladwell et al. April 2015 Physical Therapy*

- Individual semistructured interviews were conducted on 9 patients who were long term TENS users (from >1 up to 20 years of TENS use) for a variety of musculoskeletal conditions.
- Direct benefits reported by the patients were pain relief, distraction from pain and relief of muscle tension and spasm.
- Indirect benefits were reduction in medication, enhanced ability to rest & sleep, psychological & emotional benefits, and enhanced function.

TENS not only decreases pain but also has multiple direct and indirect effects that should not be overlooked when assessing the effectiveness of a TENS treatment.

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