Functional Electrical Stimulation (FES) in Pediatrics: The science is strong, the clinical practice not yet

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The mechanisms that govern the application of non-invasive functional electrical stimulation (FES) have been delineated and clearly described in numerous evidenced-based research publications. The aim of this program is to summarize the primary, multi-system effects of non-invasive FES on the musculo-skeletal system, the peripheral vascular system, and the central nervous systems. The presentation will relate these effects to multiple efficacious clinical studies in neuro-rehabilitation including pediatrics. The presentation will include discussion of the latest technological advancement in wearable FES systems and their critical role in achieving functional recovery following damage to the brain. The presentation will also offer an advanced practice model guided by the latest trend in the medical field focusing on patient-centered, personalized intervention in the management of children with damage to the brain, altered motor development, brachial plexus injury and primary muscular disease. The presentation will include multiple case presentations highlighting the benefits of using FES.

Learning Objectives:

1. Describe the latest developments in non-invasive electrical stimulation, focusing on wearable wireless functional electrical stimulation FES systems
2. Offer an advanced practice model guided by the latest trend in the medical field to focus on patient-centered, personalized intervention
3. Discuss the different stimulation requirements needed to treat children of different ages and different diagnosis including but not limited to brain, brachial plexus, spinal cord and muscle damage
4. Prescribe the most effective treatment plans to manage upper extremity, torso and locomotion deficits of the covered pediatric population

1. Alon G, Embrey DG, Brandsma BA, Stonestreet J. Comparing four electrical stimulators with different pulses properties and their effect on the discomfort and elicited Dorsiflexion. International J Physiotherapy Res 2013;1:122-129.

2. Alon G. Functional Electrical Stimulation (FES): Transforming Clinical Trials to Neuro-Rehabilitation Clinical Practice- A Forward Perspective. J Novel Physiotherapies 2013: http://dx.doi.org/10.4172/2165-7025.1000176.
3. Sours C, Alon G, Roys S, Gullapalli RG. Modulation of Resting State Functional Connectivity of the Motor Network by Transcranial Pulsed Current Stimulation (tPCS). Brain Connectivity. 2014;4(3):157-165.
4. Alon G (2014) Loss of upper Extremity Motor Control and Function affect Women more than Men. J Nov Physiother Phys Rehabil 1(1):104.
5. Alon G, Roys SR, Gullapalli RP, Greenspan JD. Non-invasive electrical stimulation of the brain (ESB) modifies the resting-state network connectivity of the primary motor cortex. Brain Res. 2011;1403:37-44.
6. Linkov G, Branski RC, Amin M, Chernichenko N, Chen C-H, Alon G, Langmore S, Richard Wong R, Kraus D. A murine model of neuromuscular electrical stimulation on subcutaneous squamous cell carcinoma: Potential implications for dysphagia therapy. Head Neck. 2012;34:1428-1433.

Outline:

- What clinicians must know about functional electrical stimulation (FES)
- The principles of the Personalized Rehabilitation Programs (PRP)
- Implementation of FES as integral component of the PIP to enable daily function of children with damage to the brain, brachial plexus, spinal cord and skeletal muscles
- Afternoon Hand-on laboratory experience using FES in Pediatrics