

## FUNCTIONAL INTERMUSCULAR REDUCTION IN SPASTICITY IN MS (MS-FIRST)

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**Background:** Multiple Sclerosis (MS) is one of the most debilitating progressive conditions impacting young adults. The signature impairment of MS is gait deviations, affecting walking efficiency in 85% of the 2.3 million people who live with MS, and caused in part, by a combination of weakness and spasticity.

**Purpose:** The aim of this study was to determine if a combination of intermuscular electrical stimulation, followed by external functional electrical stimulation combined with treadmill walking would decrease spasticity, improve strength, and thus improve gait and functional mobility in individuals with MS.

**Methods:** Using a repeated measure, pre-post experimental design, we implemented a combination protocol consisting of intermuscular and functional electrical stimulation with supported treadmill training in eight individuals with MS. We used the number of toe taps and heel raises each participant could complete to measure spasticity and strength, respectively. We measured functional changes with the Berg Balance Test, the six-minute walk test, and the 25-foot walk test, and fatigue with the Fatigue Impact Scale (FIS). We used General Estimating Equation analysis to assess changes in the outcome measures over time.

**Results:** Preliminary results indicated a statistically significant mean improvement in distance of 35.5 meters ( $p=0.0015$ ) during the six-minute walk test, a mean decrease of 1.2 seconds ( $p=0.0032$ ) in the time required to walk 25 feet, and an increase in the mean number of toe taps (5.2 taps;  $p=0.003$ ). The mean increases in Berg Balance Test scores (1.3 points;  $p=0.48$ ), the mean increases in the number of heel raises (7.3  $p=0.07$ ), and the mean decrease in FIS (4.0 points;  $p=0.5318$ ), were not statistically significant.

**Discussion/ Conclusion:** This is the first study to combine intermuscular electrical stimulation with external functional electrical stimulation during treadmill walking. The preliminary results suggest the protocol may be a viable treatment option to decrease spasticity, increase strength, and improve walking in individuals with MS. Although changes in measures of balance and fatigue were not statistically significant, the positive trend may suggest a **latent response** in balance and fatigue to changes in spasticity and strength as measured in this study. Another explanation for the large variability in balance and fatigue levels among participants is the difference in lesion location; cerebellar vs non-cerebellar. Completing our current five participants should provide greater insight to this explanation.

**Relevance to Allied Health:** Spasticity and secondary weakness can interfere with walking for people living with MS and other neurologic conditions. Spasticity can restrict many aspects of person's function, including activities of daily living, speech, and nutrition intake. Understanding how spasticity, strength, fatigue, and function interact will assist allied health professionals who work with people with MS. This is particularly important for speech/language pathology and nutritional sciences, as MS has a profound impact in both these areas.