FastFES to Improve Walking Post-Stroke: An effective intervention that is not for everyone.

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Résumé

Neurorehabilitation efforts have been limited in their ability to restore walking function after stroke. We recently completed a comprehensive study to determine the effects on the energy cost of walking (EC) and long-distance walking ability of locomotor training that combines fast walking with FES to the paretic ankle musculature (FastFES). Fifty participants > 6 months poststroke were randomized to 12 weeks of gait training at their self-selected speeds (SS), fast speeds (Fast), or FastFES. Participants' 6-minute walk test (6MWT) distance and EC at comfortable (EC-CWS) and fast (EC-Fast) walking speeds were measured pretraining, post training, and at a 3-month follow-up. The r*esults* showed that when compared with SS and Fast, FastFES produced larger reductions in EC. FastFES produced reductions of 24% and 19% in EC-CWS and EC-Fast (Ps $<$ .001), respectively, whereas neither Fast nor SS influenced EC. Further analysis showed that this improvement in EC was associated with the improvements in paretic limb ankle moment, which was only demonstrated by the FastFES group. Interestingly, between-group 6MWT differences were not observed. Furthermore, when only subjects who entered the study with maximum walking speeds of < 1.2 m/s data were analyzed, both the Fast and FastFES subjects showed significantly greater improvements in the 6-MWT distances than the subjects who trained at their self-selected walking speeds. Thus, *c*ombining fast locomotor training with FES is an effective approach to reducing the high EC of persons poststroke. The lessons learned from this study show that subject selection is critical to a successful study and that not all subjects are appropriate for any given intervention. In addition, it is critical that we understand the mechanism by which FES is operating both to design effective interventions and to select the most appropriate outcome variable. These lessons learned relate to all clinical studies and are most relevant to investigating the effectiveness of FES in individual with neurological involvement, including spinal cord injuries.

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