Reference

Filoni, S.[1], Romano, F.[2], Cardone, D.[2], Urbano, S.[1], Intiso, D.[1], Pellegrino, R.[3], Russo, E. F.[4], Perpetuini, D.[2], & Merla, A.[2]

Case Report: Improving gait and fatigue in multiple sclerosis through wearable electrical stimulation: a single-patient study.

Frontiers in Rehabilitation Sciences, 7, 1759293.
https://doi.org/10.3389/fresc.2026.1759293. Open Access

Products

EXOPULSE Mollii Suit

Major Findings

With EXOPULSE Mollii Suit after one month of stimulation:

→ **Clinically meaningful improvements in gait function after one month of stimulation compared to baseline:**

- Increase of 75m in the 6-Minute-Walk-Test (6MWT)
- Walking speed improved with +0.41 m/s as seen in the 10-Meter-Walk-Test (10MWT)
- 6.1sec improvement in the Timed Up and Go Test (TUG)

→ **15% reduction in self-reported fatigue demonstrated by the Modified Fatigue Impact Scale (MFIS) (ΔT2-T0=-6 points)**

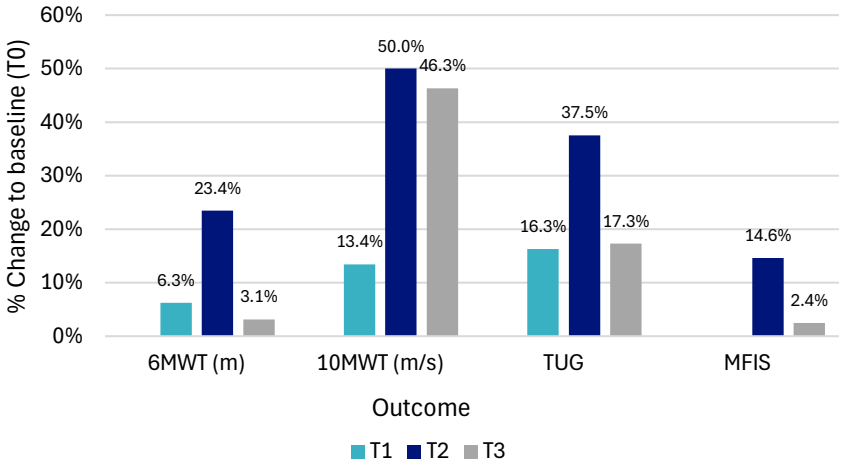

Figure 1. Percentage change vs. baseline assessment for clinical outcomes. T1= immediately after 60 minutes of stimulation; T2= After one month of stimulation; T3= Follow-up measurement one month after the intervention ended.

→ **Improvements in postural control, center of pressure (CoP) metrics, and stabilization times as demonstrated with the Hunova robotic rehabilitation platform* after one month of stimulation compared to baseline:**

- Improvements in dynamic balance
- Decrease in overall postural sway (smaller sway and sway area)
- Reduced trunk oscillation
- Improved balance recovery after platform perturbation

*An assessment platform for balance and gait rehabilitation developed by Movendo Technology (Genoa, Italy) that provides interactive assessment and training of balance, posture, and lower-limb motor function.

Population

Subjects:	n=1 (female)
Disease:	MS
Disease type:	Relapsing-remitting
Disease duration:	Not reported
EDSS Score:	3.0
Age:	53
Medication:	None

Study Design

Case study adopting a 1-month home-based intervention period where the suit was used every other day for 60 minutes. Assessments were conducted at baseline (T0), immediately after one hour of stimulation with the EXOPULSE Mollii Suit (T1), after one month of therapy (T2), and at

follow-up one month after therapy cessation (T3).

Results

Body Function & Structure					Activity			Participation	Environment
Pain	Spasticity	Physiological function	Psychological function	General Health	Activity	Mobility & Safety	ADLs	Preference, Satisfaction, QoL	Health Economics

Category	Outcomes	Results for EXOPULSE Mollii Suit				Sig.[a]
		T0[b]	T1[b]	T2[b]	T3[b]	
Psychological function	Modified Fatigue Impact Scale (MFIS)	41	n.a.	35	40	
		Results showed a 6-point reduction (41 to 35) at 1-month, which reflects a –15% reduction in perceived fatigue impact.				
Mobility & Safety	Timed Up and Go Test (TUG), (sec)	16.26	13.61	10.16	13.45	
		Indicates a -6.1 sec reduction (16.26 to 10.16) at 1-month compared to baseline. It is stated that times >12 sec often are associated with greater fall risk in MS				
	6-Minute-Walk-Test (6MWT), (m)	320	340	395	330	**n.a.**
		Walking distance improved with +75m, from 320m at baseline to 395m after one month of stimulation. Results returned toward baseline at follow-up.				
	10-Meter-Walk-Test (10MWT), (m/s)	0.82	0.93	1.23	1.20	
		Walking speed improved with +0.41m/s from baseline to 1-month.				
	Sit-to-stand 30s	10	11	13	11	

Category	Outcomes	Results for EXOPULSE Mollii Suit				Sig.[a]
		Number of repetitions completed in 30 sec increased from 10 at baseline to 13 after one month of stimulation. Results returned toward baseline at follow-up.				
	Center of Pressure (CoP):					
	Forward Co (cm)	6.40	8.16	7.12	6.79	
	Backward CoP (cm)	5.90	7.08	6.88	5.59	
	CoP ellipse area (cm^2)	263.89	105.7	73.11	218.67	
		Immediately after the treatment, forward and backward CoP excursion increased, while overall postural sway and sway area decreased. Some parameters partially returned toward baseline at follow-up.				
	Trunk oscillation[c]:					**n.a.**
	Anteroposterior sway (°)	12.05°	5.40°	5.20°	5.17°	
	Mediolateral sway (°)	1.17°	1.07°	2.14°	0.93°	
	Total postural sway (cm)	5.5	3.78	2.92	4.99	
		Trunk oscillation decreased after the treatment across anteroposterior and mediolateral directions.				
	Regain balance[c] (stabilization time), (sec)	0.78	0.65	0.78	0.53	
		Stabilization time following perturbations was shorter after the session and at follow-up, with a temporary return toward baseline at 1 month.				
	Platform tilt forward[c] (%)	-95.54	24.37	54.78	29.67	
		The response to forward platform perturbation improved after the treatment, with higher adaptation values compared to baseline.				

[a] no difference (0), positive trend (+), negative trend (–), significant (++/––), not applicable (n.a.).
[b] T0= baseline measurement; T1= immediately after 60 minutes of stimulation; T2= after one month of home-based stimulation; T3= follow-up assessment one month after therapy cessation.
[c] Higher trunk oscillation and longer stabilization times indicate poorer dynamic balance, whereas a negative adaptation percentage in platform tilt forward indicates that the patient's trunk moved significantly more than expected or in a direction that worsened the instability.

Author's Conclusion

"This case study adds to the growing body of evidence supporting the EMS as a viable, non-invasive neuromodulation tool for improving motor function in MS. Over one month of use, the patient exhibited meaningful improvements in walking, balance, and fatigue, benefits that were sustained even after stimulation stopped. The integration of robotic assessments provided robust, objective evidence of postural and neuromuscular adaptation. While more extensive trials are needed, these findings underscore the promise of wearable EMS systems in expanding the

toolkit for home-based neurorehabilitation and empowering individuals with chronic neurological conditions to reclaim function and independence."
(Filoni et al. 2026)

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