

Author Year Country Research Design Score Total Sample Size	Methods	Outcome
Thompson & Wolpaw 2021 USA RCT PEDro = 5 Level 2 N = 13	Population: 13 participants with chronic and incomplete (AIS D) SCI, signs of spasticity and the ability to walk on the treadmill for > 160 steps without stopping; 9 males and 4 females; mean ($\pm$ SD) age 49.8 ± 13.5 years; injury level C1 (n = 1), C4 (n = 2), C (n = 2), C6 (n = 2), C7 (n = 3), C8 (n = 1), T1 (n = 1), and T5 (n = 1); and mean time since injury 1.4 years. Treatment: The participants were randomly assigned to the Down-Conditioning (DC) group (n = 7) or the No-Stimulation (NS) control group (n = 6). Each person completed 6 baseline sessions and 30 control (NS group) or conditioning (DC group) sessions at a rate of 3 sessions per week. - In the DC group, the soleus H-reflex was down-conditioned during the swing-phase of walking on a treadmill with BWS. - In the NS group, the sessions consisted of walking on the treadmill with BWS for three blocks of 160 steps each without H-reflex elicitation and without any special instructions. Outcome Measures: 10MWT (during overground) and locomotor H-reflexes across the entire step cycle (during treadmill) were measured before and after the training program.	- Swing-phase H-reflex down-conditioning was successful in 6 of 7 DC participants, which is similar those for previous, steady-state operant conditioning studies in people with SCI (Thompson et al. 2013). - With swing-phase down-conditioning, the H-reflex (both the conditioned and the control) decreased much faster and much more than did the H-reflex in previous human studies with the steady-state protocol (Thompson et al. 2013), and the decrease persisted for at least 6 months after conditioning ended. - The locomotor H-reflex across the step cycle: - The modulation index (MI) of the locomotor H-reflex over the step cycle was high before the 30 conditioning sessions (DC participants: $90 \pm 8\%$) or the 30 control sessions (NS participants: $93 \pm 13\%$) and did not change significantly after the 30 sessions. - In the successful DC participants, the average locomotor H-reflex over the entire step cycle decreased by 29% ($P = 0.007$); the average stance-phase H-reflex decreased by 34% ($P = 0.04$); and the average swing-phase H-reflex decreased by 43% ($P = 0.02$). By contrast, the locomotor H-reflexes of the NS participants did not change significantly. - In the six successful DC participants, 10MWT increased significantly over the 30 conditioning sessions (with an

	For the DC group, a follow-up session (identical to the conditioning sessions) occurred 1 month (n = 6), 3 months (n = 4) and 6 months (n = 4) after the final conditioning session.	average increase from 1.04 to 1.16 m/s, [P = 0.02]). Walking speed increase was not correlated with the final H-reflex size (r = 0.33). By contrast, in the NS participants, walking speed did not change.
Thompson et al. 2013 USA RCT PEDro = 7 Level 1 N = 13	Population: 13 ambulatory participants with SCI (9M 4F); mean (SD) age: 48.4 (13.9) yrs; DOI ranging from 8 months to 50 yrs. Treatment: Participants randomly assigned at a 2:1 ratio to the DC group (6M 3F) or the unconditioned group (3M 1F). Each participant completed 6 baseline sessions and 30 control (unconditioned participants) or conditioning (DC participants) sessions at a rate of 3 sessions/week. ES of the soleus H-reflex was elicited by a 1ms square pulse stimulus. Outcome Measures: Locomotion (participant asked to walk 10 m at comfortable speed 3 times; average walking time determined); locomotor symmetry; EMG activity; H-reflex modulation.	1. Success (average conditioned H-reflexes significantly less for session 25-30 than baseline) rate for participants with SCI = 67%, which is slightly, but not significantly, less than that for neurologically normal participants (89%). 2. Conditioned H-reflex for unconditioned group as a whole showed a slight by significant increase (to (mean [SE]) 116 [7]%). Down-conditioning was achieved in 6 of 9 participants. 3. Over the 30 conditioning or control sessions, the participants' 10m walking speeds increased by 0-123%. The increase was significant in the 6 DC participants in whom the H-reflex decreased. For the 7 participants in whom H-reflex did not decrease, walking speed increased less and not significantly. 4. For DC participants with decreased H-reflex (n=6), locomotion became faster and more symmetrical and the modulation of EMG activity across the step cycle increased bilaterally.