Effectiveness of Automated Locomotor Training in Patients With Chronic Incomplete Spinal Cord Injury: A Multicenter Trial

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Abstract

Objective: To determine whether automated locomotor training with a driven-gait orthosis (DGO) can increase functional mobility in people with chronic, motor incomplete spinal cord injury (SCI).

Design: Repeated assessment of the same patients or singlecase experimental A-B design.

Setting: Research units of rehabilitation hospitals in Chicago; Heidelberg, Germany; and Basel and Zurich, Switzerland.

Participants: Twenty patients with a chronic (>2y postinjury), motor incomplete SCI, classified by the American Spinal Injury Association (ASIA) Impairment Scale with ASIA grades C (n=9) and D (n=11) injury. Most patients (n=16) were ambulatory before locomotor training.

Intervention: Locomotor training was provided using robotic-assisted, body-weight–supported treadmill training 3 to 5 times a week over 8 weeks. Single training sessions lasted up to 45 minutes of total walking time, with gait speed between .42 and .69m/s and body-weight unloading as low as possible (mean ± standard deviation, 37% ± 17%).

Main Outcome Measures: Primary outcome measures included the 10-meter walk test, the 6-minute walk test, the Timed Up & Go test, and the Walking Index for Spinal Cord Injury–II tests. Secondary measures included lower-extremity motor scores and spastic motor behaviors to assess their potential contribution to changes in locomotor function. All subjects were tested before, during, and after training.

Results: Locomotor training using the DGO resulted in significant improvements in the subjects' gait velocity, endurance, and performance of functional tasks. There were no significant changes in the requirement of walking aids, orthoses, or external physical assistance. There was no correlation between improvements in walking speed or changes in muscle strength or spastic motor behaviors.

Conclusions: Intensive locomotor training on a treadmill with the assistance of a DGO results in improved overground walking.

Paper Reference:
Wirz M, Zemon DH, Rupp R, Scheel A, Colombo G, Dietz V, Hornby TG. Effectiveness of automated locomotor training in patients with chronic incomplete spinal cord injury: a multicenter trial. Archives of Physical Medicine and Rehabilitation, 2005; 86:672-80.