

Locomotion training using voluntary driven exoskeleton (HAL) in acute incomplete SCI



A 34-year-old man had a traumatic thoracic spinal cord injury, with vertebral fracture and a right acetabulum fracture. Dorsal spinal fusion of T6 through T9 was performed on admission. The initial American Spinal Injury Association (ASIA) Impairment Scale (C) showed incomplete motor T10 lesion.

Exoskeletal locomotion training with hybrid assistive limb¹ started 77 days post trauma after radiologic confirmation of consolidation of the acetabulum fracture.

There was recovery of motor functions and walking abilities (video 1 on the *Neurology*[®] Web site at Neurology.org) throughout 12 weeks of locomotion training² with an increase in Walking Index for Spinal Cord Injury II (WISCI-II) score from 8 to 18 (video 2); conversion to ASIA D occurred.

Oliver Cruciger, MD, Martin Tegenthoff, MD, Peter Schwenkreis, MD, Thomas A. Schildhauer, MD, Mirko Aach, MD

From the Departments of Spinal Cord Injuries (O.C., M.A.), Neurology (M.T., P.S.), and General and Trauma Surgery (T.A.S.), BG University Hospital Bergmannsheil, Bochum, Germany.

Author contributions: Dr. Cruciger: concept, acquisition and data, design and analysis. Prof. Dr. Schwenkreis: critical revision of the manuscript, supervision. Prof. Dr. Tegenthoff: critical revision of the manuscript, supervision. Prof. Dr. Schildhauer: critical revision of the manuscript, supervision. Dr. Aach: concept, design, acquisition and data, supervision.

Study funding: No targeted funding reported.

Disclosure: The authors report no disclosures relevant to the manuscript. Go to Neurology.org for full disclosures.

Correspondence to Dr. Cruciger: oliver.cruciger@bergmannsheil.de

**Supplemental data
at Neurology.org**

1. Kubota S, Nakata Y, Eguchi K, et al. Feasibility of rehabilitation training with a newly developed wearable robot for patients with limited mobility. *Arch Phys Med Rehabil* 2013;94:1080–1087.
2. Schwartz I, Sajina A, Neeb M, Fisher I, Katz-Luerer M, Meiner Z. Locomotor training using a robotic device in patients with subacute spinal cord injury. *Spinal Cord* 2011;49:1062–1067.

Neurology®

Locomotion training using voluntary driven exoskeleton (HAL) in acute incomplete SCI

Oliver Cruciger, Martin Tegenthoff, Peter Schwenkreis, et al.

Neurology 2014;83;474

DOI 10.1212/WNL.0000000000000645

This information is current as of July 28, 2014

Updated Information & Services	including high resolution figures, can be found at: http://n.neurology.org/content/83/5/474.full
Supplementary Material	Supplementary material can be found at: http://n.neurology.org/content/suppl/2014/07/26/83.5.474.DC1
References	This article cites 2 articles, 0 of which you can access for free at: http://n.neurology.org/content/83/5/474.full#ref-list-1
Subspecialty Collections	This article, along with others on similar topics, appears in the following collection(s): All Rehabilitation http://n.neurology.org/cgi/collection/all_rehabilitation Gait disorders/ataxia http://n.neurology.org/cgi/collection/gait_disorders_ataxia Spastic paraplegia http://n.neurology.org/cgi/collection/spastic_paraplegia Spinal cord trauma http://n.neurology.org/cgi/collection/spinal_cord_trauma Spinal cord trauma; see Trauma/spinal cord trauma http://n.neurology.org/cgi/collection/spinal_cord_trauma-see_trauma-spinal_cord_trauma
Permissions & Licensing	Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at: http://www.neurology.org/about/about_the_journal#permissions
Reprints	Information about ordering reprints can be found online: http://n.neurology.org/subscribers/advertise

Neurology® is the official journal of the American Academy of Neurology. Published continuously since 1951, it is now a weekly with 48 issues per year. Copyright © 2014 American Academy of Neurology. All rights reserved. Print ISSN: 0028-3878. Online ISSN: 1526-632X.

