

Letter to the Editor

doi:10.1038/sj.sc.3101343

Spinal cord stimulation facilitates functional walking in a chronic, incomplete spinal cord injured subject

In the above article (*Spinal Cord* 2002; **40**: 65–68), Herman *et al.* contend that the improvements they observed were novel and that no other investigators have reported improvements in walking function in individuals with injuries classified as ASIA C. In fact, I and many others have published results of similar changes in individuals with injuries categorized as ASIA C injuries – and these without the use of invasive techniques.^{1–5,7,8}

If the data in Figure 2 in the Herman *et al.* article is converted to speed in meters per second (which are the units that most investigators report), it is evident that before use of the epidural stimulator the subject walked at 0.12 m/s. Following training with the epidural stimulator the subject walked at 0.375 m/s. While this is a dramatic improvement, I have shown that following 3 months of training using PWBT and flexor withdrawal stimulation (surface stimulation to the common peroneal nerve) similar improvements in walking speed can be achieved in individuals who started with walking speeds comparable to the subject of this article.

Further, many would argue that while Herman *et al.* did demonstrate an improvement, the individual was still not fast enough by the end of the study to make him a functional community ambulator. In a study of 36 individuals with SCI who had some walking ability, Waters *et al.*⁶ found that the mean walking speed of subjects with spinal cord injury who were community ambulators was 0.93 m/s while the mean walking speed of those who were not community ambulators was 0.45 m/s (compared with 1.3 m/s for able-bodied individuals). These figures suggest that the individual in the study by Herman *et al.* was far from achieving the walking speeds required to be a functional community ambulatory.

It is important to bear in mind that the ASIA C category is the broadest of all ASIA categories, it includes individuals with lower extremity motor scores between 1–32 (with 50 being 'normal'). There is not sufficient information presented in the article to know the subject's initial status nor to evaluate the intensity, duration and assistance provided

during the initial training period. Without this information it is not possible to fully assess the value of the findings presented, but it appears that this invasive technique provides no benefit above what I and others have reported using PWBT training and non-invasive techniques.

E Field-Fote

*The Miami Project to Cure Paralysis, Post Office Box 016960,
Mail Locator R-48, Miami, Florida 33101, USA*

References

- 1 Behrman AL, Harkema SJ. Locomotor training after human spinal cord injury: a series of case studies. *Phys Ther* 2000; **80**: 688–700.
- 2 Dietz V, Colombo G, Jensen L, Baumgartner I. Locomotor capacity of spinal cord in paraplegic patients. *Ann Neurol* 1995; **37**: 574–582.
- 3 Field-Fote EC. Combined use of body weight support, functional electrical stimulation and treadmill training to improve walking ability in individuals with chronic incomplete spinal cord injury. *Arch Phys Med Rehabil* 2001; **82**: 818–824.
- 4 Fung J, Stewart JE, Barbeau H. The combined effects of clonidine and cyproheptadine with interactive training on the modulation of locomotion in spinal cord injured subjects. *J Neurol Sci* 1990; **100**: 85–93.
- 5 Protas EJ, Holmes SA, Qureshy H, Johnson A, Lee D, Sherwood AM. Supported treadmill ambulation training after spinal cord injury: a pilot study. *Arch Phys Med Rehabil* 2001; **82**: 825–831.
- 6 Waters RL, Yakura JS, Adkins RH. Gait performance after spinal cord injury. *Clin Ortho Res* 1993; **288**: 87–96.
- 7 Wernig A, Muller S, Nanassy A, Cagol E. Laufband therapy based on 'rules of spinal locomotion' is effective in spinal cord injured persons. *Eur J Neurosci* 1995; **7**: 823–829 (erratum in *Eur J Neurosci* **7**: 1429).
- 8 Wernig A, Muller S. Laufband locomotion with body weight support improved walking in persons with severe spinal cord injuries. *Paraplegia* 1992; **30**: 229–238.