



Gait in individuals with chronic hemiparesis: one-year follow-up of the effects of a neuroprosthesis that ameliorates foot drop.

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### Abstract

**PURPOSE:** Foot drop is a common cause of gait impairment in individuals with hemiparesis. The objective of this study was to determine the short-term and long-term effects on functional gait of a neuroprosthesis that provides functional electrical stimulation (FES) to correct footdrop.

**METHODS:** Sixteen individuals (mean age, 55.0 +/- 14.6 years) with chronic hemiparesis (mean years since insult, 5.3 +/- 4.8) were assessed immediately before receiving the neuroprosthesis and two months and one year after using the device. Both follow-up assessments were conducted with FES operating; the one-year follow-up also assessed gait without FES. Outcome measures were gait velocity on an even surface during a 10-m walk, during a six-minute walk, over obstacles, and over a carpet. Foot switches used during the six-minute walk determined stance time, stride time variability, and gait asymmetry. The effect of time and the one-year carryover effect on gait without FES were determined, with significance set at  $P = 0.05$ .

**RESULTS:** The neuroprosthesis had a significant short-term and long-term effect on most measured variables. Thus, mean 10-m walk gait velocity improved in two months from 0.67 m/sec to 0.86 m/sec and continued to increase to 1.06 m/sec by the one-year assessment. A carryover effect on gait velocity and stance time without FES were also noted. The 10-m gait velocity without the neuroprosthesis increased by 23.8% by the one-year follow-up assessment.

**CONCLUSIONS:** The neuroprosthesis appears to improve gait performance, and gains were further enhanced over time and carried over to gait even without FES. These results suggest orthotic and therapeutic effects on footdrop after prolonged use of the neuroprosthesis.

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