



# Accelerometer-Triggered Electrical Stimulation for Reach and Grasp in Chronic Stroke Patients: A Pilot Study

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## Abstract

*Background.* Electrical stimulation of the upper extremity may reduce impairment in patients following stroke. Stimulation triggered on demand combined with task practice may be an effective means of promoting recovery of function. *Objective.* The authors investigated the feasibility of using accelerometer-controlled electrical stimulation for the elbow, wrist, and finger extensors to enable functional task practice in patients with chronic hemiparesis. *Methods.* Following a 4-week baseline, participants received 2 weeks of cyclic stimulation exercise to elbow and forearm extensor muscles, followed by 10 weeks of triggered stimulation to practice functional reaching. Participants were reassessed 12 weeks later as well. Outcome measures were the Action Research Arm Test (ARAT), Modified Ashworth Scale (MAS), Canadian Occupational Performance Measure (COPM), Psychosocial Impact of Assistive Devices Scale (PIADS), and Use of Device Questionnaire (UDQ). *Results.* Fifteen volunteers who had at least 45° of forward shoulder flexion and could initiate elbow extension and grasp completed the study. The ARAT score improved from 19 to 32 ( $P = .002$ ); the MAS score for elbow, wrist, and finger flexor spasticity was reduced from 2 each to 1, 0, and 1 ( $P < .05$ ); the COPM performance and satisfaction scores improved ( $P = .001$ ); and the PIADS became positive for competence ( $P = .005$ ), adaptability ( $P = .008$ ), and self-esteem ( $P = .008$ ). Gains were maintained 12 weeks later. *Conclusions.* Accelerometer-triggered electrical stimulation to augment task training for the hemiplegic arm is feasible and may improve functional ability and quality of life which may be maintained 12 weeks after treatment. A randomized trial design is required to evaluate efficacy and cost benefit.

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