Functional electrostimulation in poststroke rehabilitation: a meta-analysis of the randomized controlled trials
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Authors' objectives
To assess the efficacy of functional electrical stimulation (FES) in the rehabilitation of hemiparesis in stroke.

Searching
MEDLINE was searched from 1966 to 1994. In addition, bibliographies of review and empirical articles, and relevant texts and articles suggested by experts, were examined. The search strategy is given.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were included.

Specific interventions included in the review
Electrostimulation, and electrostimulation plus biofeedback and physical therapy.

Participants included in the review
Patients in post-stroke rehabilitation were included.

Outcomes assessed in the review
The main outcome measure was recovery of paretic muscle force of contraction. Wrist extension, knee extension, ankle dorsiflex torque and ankle dorsiflexion were used as end points in the included studies.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the authors performed the selection.

Assessment of study quality
The articles were scored for quality using the method suggested by Chalmers et al. (see Other Publications of Related Interest no.1). Differences in quality score were not used to exclude trials, on the grounds that so few trials were identified. However these scores were used as part of a narrative discussion of the quality of the trials. The papers were assessed for validity by two independent reviewers, and any differences of opinion were resolved by consensus.

Data extraction
The outcome data were extracted by two reviewers who were blinded to the author, journal and conclusions of the study. Any discrepancies were resolved by discussion with a third author. The data were taken directly from tables or text or extrapolated from graphs, and effect sizes and standard errors were calculated according to the method of Glass et al. (see Other Publications of Related Interest no.2).

Methods of synthesis
How were the studies combined?
The studies were combined by meta-analysis: a DerSimonian and Laird random-effects model was used to calculate a pooled effect size and 95% confidence intervals (CIs).

How were differences between studies investigated?
A statistical test for heterogeneity was carried out (expressed as a Q-statistic).
Results of the review
Four RCTs were identified for inclusion, representing a total of 132 patients.

The pooled effect size of 0.63 (95% CI: 0.29, 0.98) represented a significant effect of treatment on muscle force after stroke (p<0.05).

Cost information
It is stated that the units which deliver electrostimulation are relatively inexpensive (US$1,250).

Authors' conclusions
FES appears to be effective in improving muscle strength recovery after stroke, though muscle strength recovery is only one component of the composite neurological deficit that occurs with upper motor neuron injury.

CRD commentary
The authors note that all the studies are of relatively low quality and unblinded, and only one of the included studies had a sham control. This would suggest caution in assuming that FES is particularly effective in stroke rehabilitation. In addition, the review was restricted to English language publications, and found only 4 RCTs; a wider search across other databases, and the inclusion of trials in other languages, is probably required to provide a more precise estimate of the efficacy of this treatment.

Implications of the review for practice and research
Future studies should be double-blind and sham-controlled, and ideally should examine more sustained and complex aspects of neurofunctional recovery after stroke.

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Other publications of related interest

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.