Transcranial direct current stimulation (tDCS) for improving activities of daily living, and physical and cognitive functioning, in people after stroke

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Background. Stroke is one of the leading causes of disability worldwide. Functional impairment, resulting in poor performance in activities of daily living (ADL) among stroke survivors is common. Current rehabilitation approaches have limited effectiveness in improving ADL performance, function, muscle strength, and cognitive abilities (including spatial neglect) after stroke, with improving cognition being the number one research priority in this field. A possible adjunct to stroke rehabilitation might be non‐invasive brain stimulation by transcranial direct current stimulation (tDCS) to modulate cortical excitability, and hence to improve these outcomes in people after stroke.
Objectives. To assess the effects of tDCS on ADL, arm and leg function, muscle strength and cognitive abilities (including spatial neglect), dropouts and adverse events in people after stroke.
Search Methods. We searched the Cochrane Stroke Group Trials Register, CENTRAL, MEDLINE, Embase and seven other databases in May 2023. In an effort to identify further published, unpublished, and ongoing trials, we also searched trials registers and reference lists, handsearched conference proceedings, and contacted authors and equipment manufacturers.
Selection Criteria. This is the update of an existing review. In the previous version of this review, we focused on the effects of tDCS on ADL and function. In this update, we broadened our inclusion criteria to compare any kind of active tDCS for improving ADL, function, muscle strength and cognitive abilities (including spatial neglect) versus any kind of placebo or control intervention.
Data Collection and Analysis. Two review authors independently assessed trial quality and risk of bias, extracted data, and applied GRADE criteria. If necessary, we contacted study authors to ask for additional information. We collected information on dropouts and adverse events from the trial reports.
Main Results. We included at least 67 studies involving a total of at least 1729 patients after stroke. We also identified 116 ongoing studies. The risk of bias did not differ substantially for different comparisons and outcomes. The majority of participants had ischaemic stroke, with mean age between 43 and 75 years, in the acute, postacute, and chronic phase after stroke, and level of impairment ranged from severe to less severe. Included studies differed in terms of type, location and

duration of stimulation, amount of current delivered, electrode size and positioning, as well as type and location of stroke.
At least two studies with at least 56 participants found no evidence of effect of tDCS on cognitive abilities (low ‐ quality evidence), but one study with at least 30 participants found evidence of effect of tDCS for improving spatial neglect (very low ‐ quality evidence).
In at least 47 studies with at least 1330 participants, the proportions of dropouts and adverse events were comparable between groups (risk ratio (RR) 1.25, 95% CI 0.74 to 2.13; random ‐ effects model; moderate ‐ quality evidence).
Authors' Conclusions. Evidence of very low quality suggests that there is an effect on hemispatial neglect. There was moderate ‐ quality evidence that adverse events and numbers of people discontinuing the treatment are not increased. Future studies should particularly engage with patients who may benefit the most from tDCS after stroke, but also should investigate the effects in routine application. Therefore, further large ‐ scale randomised controlled trials with a parallel ‐ group design and sample size estimation for tDCS are needed.