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

Elsner B, Kugler J, Pohl M, Mehrholz J

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Transcranial direct current stimulation (tDCS) for improving activities of daily living, and physical and cognitive functioning, in people after stroke.
Cochrane Database of Systematic Reviews 2020, Issue 11. Art. No.: CD009645.
DOI: 10.1002/14651858.CD009645.pub4.

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[Intervention Review]

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

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Editorial group: Cochrane Stroke Group.
Publication status and date: New search for studies and content updated (no change to conclusions), published in Issue 11, 2020.

Citation: Elsner B, Kugler J, Pohl M, Mehrholz J. Transcranial direct current stimulation (tDCS) for improving activities of daily living, and physical and cognitive functioning, in people after stroke. *Cochrane Database of Systematic Reviews* 2020, Issue 11. Art. No.: CD009645. DOI: 10.1002/14651858.CD009645.pub4.

ABSTRACT

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 January 2019. In an effort to identify further published, unpublished, and ongoing trials, we also searched trials registers and reference lists, handsearched conference proceedings, and contacted authors and equipment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 67 studies involving a total of 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.

We found 23 studies with 781 participants examining the effects of tDCS versus sham tDCS (or any other passive intervention) on our primary outcome measure, ADL after stroke. Nineteen studies with 686 participants reported absolute values and showed evidence of effect regarding ADL performance at the end of the intervention period (standardised mean difference (SMD) 0.28, 95% confidence interval (CI) 0.13 to 0.44; random-effects model; moderate-quality evidence). Four studies with 95 participants reported change scores, and showed an effect (SMD 0.48, 95% CI 0.02 to 0.95; moderate-quality evidence). Six studies with 269 participants assessed the effects of tDCS on ADL at the end of follow-up and provided absolute values, and found improved ADL (SMD 0.31, 95% CI 0.01 to 0.62; moderate-quality evidence). One study with 16 participants provided change scores and found no effect (SMD -0.64, 95% CI -1.66 to 0.37; low-quality evidence). However, the results did not persist in a sensitivity analysis that included only trials with proper allocation concealment.

Thirty-four trials with a total of 985 participants measured upper extremity function at the end of the intervention period. Twenty-four studies with 792 participants that presented absolute values found no effect in favour of tDCS (SMD 0.17, 95% CI -0.05 to 0.38; moderate-quality evidence). Ten studies with 193 participants that presented change values also found no effect (SMD 0.33, 95% CI -0.12 to 0.79; low-quality evidence). Regarding the effects of tDCS on upper extremity function at the end of follow-up, we identified five studies with a total of 211 participants (absolute values) without an effect (SMD -0.00, 95% CI -0.39 to 0.39; moderate-quality evidence). Three studies with 72 participants presenting change scores found an effect (SMD 1.07; 95% CI 0.04 to 2.11; low-quality evidence). Twelve studies with 258 participants reported outcome data for lower extremity function and 18 studies with 553 participants reported outcome data on muscle strength at the end of the intervention period, but there was no effect (high-quality evidence). Three studies with 156 participants reported outcome data on muscle strength at follow-up, but there was no evidence of an effect (moderate-quality evidence). Two studies with 56 participants found no evidence of effect of tDCS on cognitive abilities (low-quality evidence), but one study with 30 participants found evidence of effect of tDCS for improving spatial neglect (very low-quality evidence). In 47 studies with 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

There is evidence of very low to moderate quality on the effectiveness of tDCS versus control (sham intervention or any other intervention) for improving ADL outcomes after stroke. However, the results did not persist in a sensitivity analyses including only trials with proper allocation concealment. Evidence of low to high quality suggests that there is no effect of tDCS on arm function and leg function, muscle strength, and cognitive abilities in people after stroke. 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.

PLAIN LANGUAGE SUMMARY

Direct electrical current to the brain to improve rehabilitation outcomes

Review question

We reviewed the evidence about the effect of direct electrical current to the brain (transcranial direct current stimulation, tDCS) to reduce impairment in activities of daily living (ADL), arm and leg function, muscle strength and cognitive abilities (including spatial neglect), dropouts and adverse events in people after stroke.

Background

Stroke is one of the leading causes of disability worldwide. Most strokes take place when a blood clot blocks a blood vessel leading to the brain. Without a proper blood supply, the brain quickly suffers damage, which can be permanent. This damage often causes impairment of ADL, motor and cognitive function among stroke survivors. According to people with stroke, carers and health professionals, improving cognitive abilities after stroke is the number one research priority in this field of medicine. Therefore, neurological rehabilitation, including effective training strategies, is needed to facilitate recovery and to reduce the burden of stroke. Therapies tailored to patients' and carers' needs are especially important. Current rehabilitation strategies have limited effectiveness in improving these impairments. One possibility for enhancing the effects of rehabilitation might be the addition of brain stimulation without breaking the skin, by means of tDCS. This technique can alter how the brain works and may be used to reduce impairment of ADL and function. However, the effectiveness of this intervention for improving rehabilitation outcomes is still unknown.

Search date

The review is current to January 2019.

Study characteristics

We included 67 studies involving a total of 1729 adult participants with acute, postacute or chronic ischaemic or haemorrhagic stroke. The mean age in the experimental groups ranged from 43 years up to 70 years, and from 45 years up to 75 years in the control groups. The level of participants' impairment ranged from severe to moderate. The majority of studies were conducted in an inpatient setting. Several different stimulation types with different stimulation durations and dosages were administered and compared with sham tDCS or an active control intervention. Sham tDCS means that the stimulation is switched off covertly in the first minute of the intervention.

Key results

This review found that tDCS might enhance ADL, but does not improve arm and leg function, muscle strength and cognitive abilities. Proportions of adverse events and people discontinuing the treatment were comparable between groups. Included studies differed in terms of type, location and duration of stimulation, the amount of current delivered, electrode size and positioning,as well as type and location of stroke. Future research is needed in this area to foster the evidence base of these findings, especially regarding arm and leg function, muscle strength and cognitive abilities (including spatial neglect).

Quality of the evidence

The quality of evidence for tDCS for improving ADL ranged from very low to high. It was low to moderate for upper extremity function, and moderate for adverse events and people discontinuing the treatment.

SUMMARY OF FINDINGS

Summary of findings 1. tDCS versus any type of placebo or passive control intervention for improving activities of daily living, and physical and cognitive functioning at the end of intervention period, in people after stroke

tDCS versus any type of placebo or passive control intervention for improving activities of daily living, and physical and cognitive functioning at the end of intervention period, in people after stroke

Patient or population: people with stroke
Settings: inpatient and outpatient setting
Intervention: tDCS versus any type of placebo or passive control intervention

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	Control	TDCS versus any type of placebo or passive control intervention				
Primary outcome measure: mean ADL at the end of the intervention period Measures of activities of daily living. Scale from: 0 to infinity.		Absolute values in the intervention groups were **0.28 standard deviations higher (absolute values)** (0.13 to 0.44 higher)		686 (19 studies)	⊕⊕⊕⊖ **moderate** [a]	SMD 0.28 (0.13 to 0.44); however, this effect was not sustained when including only studies with adequate allocation concealment (Table 1)
		Change scores in the intervention groups were **0.48 standard deviations higher (change scores)** (0.02 to 0.95 higher)		95 (4 studies)	⊕⊕⊕⊖ **moderate** [b]	SMD 0.48 (0.02 to 0.95); however, this effect was not sustained when including only studies with adequate allocation concealment (Table 1)
Secondary outcome measure: mean upper extremity function at the end of the intervention period		Absolute values in the intervention groups were **0.17 standard deviations higher (absolute values)** (0.05 lower to 0.38 higher)		792 (24 studies)	⊕⊕⊕⊖ **moderate** [d]	SMD 0.17 (-0.05 to 0.38)

Clinical measures of upper extremity function. Scale from: 0 to infinity.		Change scores in the intervention groups was **0.33 standard deviations higher (change scores)** (0.12 lower to 0.79 higher)		193 (10 studies)	⊕⊕⊖⊖ **low** [b,e]	SMD 0.33 (-0.12 to 0.79)
Secondary outcome measure: mean lower extremity function at the end of the intervention period Clinical measures of lower extremity function. Scale from: 0 to infinity.		Absolute values in the intervention groups were **0.28 standard deviations higher (absolute values)** (0.12 lower to 0.69 higher)		204 (8 studies)	⊕⊕⊕⊖ **moderate** [b]	SMD 0.28 (-0.12 to 0.69)
		Change scores in the intervention groups was **0.46 standard deviations higher (change scores)** (0.09 lower to 1.01 higher)		54 (4 studies)	⊕⊕⊕⊖ **moderate** [b]	SMD 0.46 (-0.09 to 1.01)
Secondary outcome measure: mean muscle strength at the end of the intervention period Clinical measures of muscle strength. Scale from: 0 to infinity.		Absolute values in the intervention groups were **0.19 standard deviations higher (absolute values)** (-0.01 lower to 0.38 higher)		437 (13 studies)	⊕⊕⊕⊕ **high**	SMD 0.19 (-0.01 to 0.38)
		Change scores in the intervention groups were **0.19 standard deviations higher (change scores)** (-0.01 lower to 0.38 higher)		116 (5 studies)	⊕⊕⊕⊖ **moderate** [b]	SMD 0.07 (-0.66 to 0.8)
Secondary outcome measure: mean cognitive abilities at the end of the intervention period Clinical measures of cognitive abilities. Scale from: 0 to infinity.		Mean in the intervention groups was **0.46 standard deviations higher** (0.1 lower to 1.02 higher)		56 (2 studies)	⊕⊕⊖⊖ **low** [b,e]	SMD 0.46 (-0.1 to 1.02)
Secondary outcome measure: mean hemispatial neglect at the end of intervention period		Mean in the intervention groups was **4.8 higher** (0.13 to 9.47 higher)		30 (1 study)	⊕⊖⊖⊖ **very low** [b,c,e]	No statistical pooling possible
Secondary outcome measure: dropouts, adverse events and	**Study population**		**RR 1.25** (0.74 to 2.13)	1330 (47 studies)	⊕⊕⊕⊖ **moderate** [d]	

deaths during the intervention period Number of adverse events, dropouts and deaths during the intervention period	**34 per 1000**	**42 per 1000** (25 to 72)
	Moderate	
	0 per 1000	**0 per 1000** (0 to 0)

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
ADL: Activities of daily life; **CI:** Confidence interval; **RR:** Risk ratio;**SMD:** Standardised mean difference; **tDCS:** transcranial direct current stimulation

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[a]Downgraded one level because 95% CI contains effect size of the minimal important difference.
[b]Downgraded one level because the total sample size is less than 400 (as a rule of thumb for implementing GRADE 'optimal information size' criteria).
[c]Downgraded one level due to study ratings with 'high' risk of bias
[d]Downgraded one level because 95% CI contains effect size of no difference and the minimal important difference.
[e]Publication bias strongly suspected by visual inspection of funnel plot. Downgraded one level.

Summary of findings 2. tDCS versus any type of active control intervention for improving activities of daily living, and physical and cognitive functioning at the end of intervention period, in people after stroke

tDCS versus any type of active control intervention for improving activities of daily living, and physical and cognitive functioning at the end of intervention phase, in people after stroke

Patient or population: people with stroke
Settings: inpatient and outpatient setting
Intervention: tDCS versus any type of active control intervention

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	Control	TDCS versus any type of active control intervention				

Primary outcome measure: mean ADL at the end of the intervention period Barthel Index. Scale from: 0 to 100.	Absolute values in the control groups was **69.2 Barthel Index Score**	Absolute values in the intervention groups was **6.59 higher** (1.26 to 11.91 higher)		121 (3 studies)	⊕⊕⊝⊝ **low** [a,b]	
Secondary outcome measure: mean upper extremity function at the end of the intervention period Clinical measures of upper extremity function. Scale from: 0 to infinity.		Absolute values in the intervention groups was **0.84 standard deviations higher (absolute values)** (0.2 to 1.48 higher)		124 (5 studies)	⊕⊕⊝⊝ **low** [a,b]	SMD 0.84 (0.2 to 1.48)
		Change scores in the intervention groups was **0.51 standard deviations higher (change scores)** (0.2 to 1.22 higher)		32 (1 study)	⊕⊕⊝⊝ **low** [a,b]	SMD 0.51 (0.20 to 1.22)
Secondary outcome measure: mean lower extremity function at the end of the intervention period		Mean in the intervention groups was **0.23 standard deviations higher** (0.66 lower to 1.13 higher)		66 (3 studies)	⊕⊕⊕⊝ **moderate** [a]	SMD 0.23 (-0.66 to 1.13)
Secondary outcome measure: mean muscle strength at the end of the intervention period		Mean in the intervention groups was **0.08 standard deviations higher** (0.44 lower to 0.6 higher)		57 (2 studies)	⊕⊕⊝⊝ **low** [a,b]	SMD 0.08 (-0.44 to 0.6)
Secondary outcome measure: cognitive abilities at the end of the intervention period	No evidence available					
Secondary outcome measure: spatial neglect at the end of the intervention period	See comment	See comment	Not estimable	12 (1 study)	⊕⊕⊕⊝ **moderate** [a]	
Secondary outcome measure: dropouts, adverse events and deaths during the intervention period Adverse events, dropouts and deaths during the intervention period	**Study population**		**RR 1.76** (0.43 to 7.17)	209 (7 studies)	⊕⊕⊕⊝ **moderate** [a]	
	19 per 1000	**34 per 1000** (8 to 139)				
	Moderate					
	0 per 1000	**0 per 1000**				

	(0 to 0)

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
ADL: Activities of daily life; **CI:** Confidence interval; **RR:** Risk ratio; **SMD:** Standardised mean difference; **tDCS:** transcranial direct current stimulation

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[a]Downgraded one level due to total sample size being less than 400 (as a rule of thumb for implementing GRADE 'optimal information size' criteria).
[b]Downgraded one level due to several study ratings with 'high' risk of bias.

Summary of findings 3. tDCS versus any type of placebo or passive control intervention for improving activities of daily living, and physical and cognitive functioning at the end of follow-up, in people after stroke

tDCS versus any type of placebo or passive control intervention for improving activities of daily living, and physical and cognitive functioning at the end of follow-up, in people after stroke

Patient or population: patients with improving activities of daily living, and physical and cognitive functioning at the end of follow-up, in people after stroke
Settings: inpatient and outpatient
Intervention: tDCS

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	Control	tDCS				
Primary outcome measure: mean ADL until the end of follow-up Measures of activities of daily living. Scale from: 0 to infinity.		Absolute values in the intervention groups was **0.31 standard deviations higher (absolute values)** (0.01 to 0.62 higher)		269 (6 studies)	⊕⊕⊕⊖ **moderate** [b]	SMD 0.31 (0.01 to 0.62)
		Change scores in the intervention groups was **0.64 standard deviations lower (change scores)** (1.66 lower to 0.37 higher)		16 (1 study)	⊕⊕⊖⊖ **low** [a,b]	SMD -0.64 (-1.66 to 0.37)

Secondary outcome measure: mean upper extremity function to the end of follow-up Clinical measures of upper extremity function. Scale from: 0 to infinity.	Absolute values in the intervention groups was **0 standard deviations higher (absolute values)** (0.39 lower to 0.39 higher)		211 (5 studies)	⊕⊕⊕⊖ **moderate** [b]	SMD 0 (-0.39 to 0.39)
	Change scores in the intervention groups was **0.51 standard deviations higher (change scores)** (-0.20 to 1.22 higher)		32 (1 study)	⊕⊕⊖⊖ **low** [b,c]	SMD 0.51 (-0.20, 1.22)
Secondary outcome measure: lower extremity function to the end of follow-up	No evidence available				
Secondary outcome measure: mean muscle strength at the end of follow-up	Mean in the intervention groups was **0.07 standard deviations higher** (0.26 lower to 0.41 higher)		156 (3 studies)	⊕⊕⊕⊖ **moderate** [b]	SMD 0.07 (-0.26 to 0.41)
Secondary outcome measure: cognitive abilities at the end of follow-up	No evidence available				
Secondary outcome measure: hemispatial neglect at the end of follow-up	No evidence available				

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
ADL: Activities of daily living; **CI:** Confidence interval; **SMD:** Standardised mean difference; **tDCS:** transcranial direct current stimulation

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[a]Downgraded one level due to study ratings with 'high' risk of bias.
[b]Downgraded one level because the total sample size is less than 400 (as a rule of thumb for implementing GRADE 'optimal information size' criteria).
[c]Downgraded one level because publication bias strongly suspected.

Summary of findings 4. tDCS versus any type of active control intervention for improving activities of daily living, and physical and cognitive functioning at the end of follow-up, in people after stroke

tDCS versus any type of active control intervention for improving activities of daily living, and physical and cognitive functioning at the end of follow-up, in people after stroke

Patient or population: people with stroke
Settings: inpatient and outpatient
Intervention: tDCS

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	Control	tDCS				
Primary outcome measure: mean ADL at the end of follow-up Scale from: 0 to 100.	No evidence available					
Secondary outcome measure: mean upper extremity function to the end of follow-up per cent change in Jebsen-Taylor-Test		Mean in the intervention groups was **10 higher** (0.07 lower to 20.07 higher)		32 (1 study)	⊕⊕⊕⊖ **moderate** [a]	
Secondary outcome measure: lower extremity function at the end of follow-up	No evidence available					
Secondary outcome measure: muscle strength at the end of follow-up	No evidence available					
Secondary outcome measure: cognitive abilities at the end of follow-up	No evidence available					
Secondary outcome measure: hemispatial neglect at the end of follow-up	No evidence available					

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
ADL: Activities of daily life; **CI:** Confidence interval; **SMD:** Standardised mean difference; **tDCS:** transcranial direct current stimulation

GRADE Working Group grades of evidence

High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

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[a]Downgraded one level due to total sample size being less than 400 (as a rule of thumb for implementing GRADE 'optimal information size' criteria).

BACKGROUND

Description of the condition

Every year, 15 million people worldwide suffer from stroke (WHO 2011). Of these, nearly six million die (Mathers 2011). Another five million people are left permanently disabled by stroke every year (WHO 2011). Hence, stroke is one of the leading causes of death worldwide and has a considerable impact on disease burden (WHO 2011). Stroke affects function and many activities of daily living (ADL). Three out of four stroke patients have an impairment in performing ADL at hospital admission, and only about one-third of patients who have completed rehabilitation have achieved normal neurological function (Jørgensen 1999). Around half of patients do not regain function of the affected arm six months after stroke (Kwakkel 2003). Three out of four people with stroke suffer from working memory impairment and may thus experience executive dysfunction (Riepe 2004). Based on ratings by people with stroke, carers and health professionals, improving cognition after stroke is the number one research priority in stroke medicine (Pollock 2012). Therefore, neurological rehabilitation (including effective training strategies) is needed to facilitate recovery and to reduce the burden of stroke (Barker 2005). Therapies tailored to patients' and carers' needs are especially important (Barker 2005).

Description of the intervention

Transcranial direct current stimulation (tDCS) is a non-invasive method used to modulate cortical excitability by applying a direct current to the brain (Bindman 1964; Nowak 2009; Purpura 1965). Stimulation of the central nervous system by tDCS is inexpensive when compared with repetitive transcranial magnetic stimulation (rTMS) and epidural stimulation (Hesse 2011).

How the intervention might work

Transcranial direct current stimulation (tDCS) usually is delivered via saline-soaked surface sponge electrodes, which are connected to a direct current stimulator of low intensity (Lang 2005). Three different applications might be used: 1) the anodal electrode may be placed over the presumed area of interest of the brain with the cathodal electrode placed above the contralateral orbit (anodal stimulation, A-tDCS); 2) the cathodal electrode may be placed over the presumed area of interest of the brain with the anodal electrode placed above the contralateral orbit (cathodal stimulation, C-tDCS) (Hesse 2011); or 3) anodal stimulation and cathodal stimulation may be applied simultaneously (dual-tDCS) (Lindenberg 2010). Primarily resulting from a shift of the resting potential of the brain's neurons, tDCS using anodal stimulation might lead to increased cortical excitability, whereas cathodal stimulation might lead to decreased excitability (Bindman 1964; Floel 2010; Purpura 1965). Stimulation lasting for longer than five minutes might induce significant after-effects (which probably are mainly due to changes in synaptic mechanisms), which could last up to several hours (Nitsche 2001; Nitsche 2003). These effects probably are 1) anatomically specific (referring to how the electrodes are positioned and which way the current takes to reach the targeted brain areas); 2) activity-selective and task-specific (meaning that neuronal networks active during a certain activity are preferentially stimulated by tDCS); and 3) input-selective (meaning that tDCS would alter the neuronal system's input and thereby enhance information processing) (Bikson 2013). The facilitating effect of tDCS could be used to facilitate motor learning in healthy people (Boggio 2006; Jeffery 2007; Nitsche 2001; Nitsche 2003; Reis 2009), and appears to be a promising option in rehabilitation after stroke.

Why it is important to do this review

Previous versions of this review suggested that tDCS, with or without simultaneous upper extremity training, in people with stroke, results in greater improvement in arm motor function when compared with sham tDCS alone (Elsner 2013; Elsner 2016). Some pilot studies have even reported improvement in ADL, such as turning over playing cards, picking up beans with a spoon, and manipulating light and heavy objects with the arm (Fregni 2005; Hummel 2005; Kim 2009). However, these findings were not supported by a large-scale multicentre randomised controlled trial (RCT), which did not find any effects on measures of ADL (Hesse 2011). There is contradictory evidence on the additional effect of tDCS on lower extremity function and gait (Cha 2014; Fusco 2014; Geroin 2011; Tahtis 2012). There are indications that tDCS might also improve working memory or neglect by modulating excitability of the corresponding brain areas (Au-Yeung 2014; Jo 2008a; Kang 2008b; Ko 2008a; Park 2013; Sunwoo 2013a). However, in a systematic review of RCTs about the effects of tDCS on aphasia, no evidence of an effect was found (Elsner 2015). Despite the fact that adverse effects associated with the application of tDCS have been reported rarely so far, concerns about the safety of tDCS regarding its impact on cerebral autoregulation have recently emerged (List 2015; Nitsche 2015).

To date, studies of tDCS have tended to include small sample sizes. Currently, no systematic review has comprehensively synthesised the findings of available RCTs. Therefore, a systematic review of RCTs investigating the effectiveness and acceptability of tDCS for improving ADL, motor function and cognitive abilities (including spatial neglect) in people with stroke is required.

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.

METHODS

Criteria for considering studies for this review

Types of studies

We included RCTs and randomised controlled cross-over trials, from which we analysed only the first period as a parallel-group design. We did not include quasi-RCTs.

Types of participants

We included adult participants (18 years of age and older) who had experienced a stroke. We used the World Health Organization (WHO) definition of stroke (Hatano 1976), or a clinical definition, if not specifically stated (i.e. signs and symptoms persisting longer than 24 hours). We included participants regardless of initial level of impairment, duration of illness, or gender.

Types of interventions

This is the update of an existing review. In the previous versions 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 (i.e. sham tDCS, no intervention or conventional motor rehabilitation). We defined active tDCS as the longer-lasting (lasting longer than two minutes) application of a direct current to the brain to stimulate the affected hemisphere, or to inhibit the healthy hemisphere (NItsche 2000). We defined sham tDCS as short-term direct current stimulation (lasting less than two minutes; this is approximately the time it usually takes to fade in and fade out the current in sham-controlled tDCS trials in order to produce perceivable sensations on the skin similar to active tDCS (Gandiga 2006), or placement of electrodes with no direct current applied.

Types of outcome measures

Below, we describe the primary and secondary outcomes.

Primary outcomes

The primary outcome was ADL, regardless of their outcome measurement. However, we prioritised generally accepted outcome measures in the following order to facilitate quantitative pooling.

1. Frenchay Activities Index (FAI) (Schuling 1993)
2. Barthel ADL Index (BI) (Mahoney 1965)
3. Rivermead ADL Assessment (Whiting 1980)
4. Modified Rankin Scale (mRS) (Bonita 1988)
5. Functional Independence Measure (FIM) (Hamilton 1994)

We analysed primary outcomes according to their time point of measurement as follows: 1) at the end of the study period; and 2) at follow-up: from three to 12 months after the study end. In cases where included studies reported ADL in other measures than those mentioned above, all review authors discussed and reached consensus about the outcome measures to be included in the primary outcome analysis.

Secondary outcomes

In this update we defined secondary outcomes as upper limb function, lower limb function, muscle strength, cognitive abilities (including spatial neglect), safety, with appropriate measures as reported in the studies. We preferred interval-scaled outcome measures rather than ordinal-scaled or nominal-scaled ones. We prioritised secondary outcome measures as follows.

For upper limb function:

1. Action Research Arm Test (ARAT) (Lyle 1981);
2. Fugl-Meyer Score (Fugl-Meyer 1975);
3. Nine-Hole Peg Test (NHPT) (Sharpless 1982); and
4. Jebsen Taylor Hand Function Test (JTT) (Jebsen 1969).

For lower limb function:

1. walking velocity (in metres per second);
2. walking capacity (metres walked in six minutes); and
3. Functional Ambulation Categories (FAC) (Holden 1984).

For muscle strength:

1. grip force (measured by handheld dynamometer) (Boissy 1999); and
2. Motricity Index Score (Demeurisse 1980).

For cognitive abilities, such as working memory, attention and spatial neglect:

1. Montreal Cognitive Assessment (Nasreddine 2005);
2. Clock Drawing Test (Goodglass 1983);
3. Executive Function (assessments have been described in Chung 2013);
4. target cancellation (Molenberghs 2011);
5. line bisection (Molenberghs 2011);
6. other measures of cognitive abilities; and
7. other measures of spatial neglect.

For safety:

1. measured by the number of dropouts and adverse events (including death from all causes).

Depending on the measurements provided in the included trials, all review authors discussed and reached consensus about which outcome measures should be included in the analysis of secondary outcomes.

Search methods for identification of studies

See the methods for the Cochrane Stroke Group Specialised register. We searched for relevant trials in all languages and arranged translation of trial reports where necessary.

Electronic searches

According to the increased scope of this update we re-ran our searches with updated search strategies of the Cochrane Stroke Group Trials Register (January 2019) and the following electronic bibliographic databases.

1. Cochrane Central Register of Controlled Trials (CENTRAL; the Cochrane Library; 2019, Issue 1) (Appendix 1)
2. MEDLINE Ovid (1948 to January 2019) (Appendix 2)
3. Embase Ovid (1980 to January 2019) (Appendix 3)
4. CINAHL Ebsco (Cumulative Index to Nursing and Allied Health Literature; 1982 to January 2019) (Appendix 4)
5. AMED Ovid (1985 to January 2019) (Appendix 5)
6. Science Citation Index (Web of Science) (1899 to February 2015) (Appendix 6)
7. Physiotherapy Evidence Database (PEDro) at www.pedro.org.au/ (January 2019) (Appendix 7)
8. Rehabdata at www.naric.com/?q=REHABDATA (1956 to January 2019) (Appendix 8)
9. Compendex (Engineering Village by Elsevier; 1969 to January 2019) (Appendix 9)
10. Inspec (Engineering Village by Elsevier; 1969 to January 2019) (Appendix 9)

We developed the MEDLINE search strategy with the help of the Cochrane Stroke Group Information Specialist and adapted it for the other databases.

We also searched the following ongoing trials and research registers (January 2019).

1. WHO International Clinical Trials Registry Platform (apps.who.int/trialsearch/)
2. ClinicalTrials.gov (clinicaltrials.gov)

Searching other resources

We carried out the following additional searches to identify further published, unpublished and ongoing trials not available in the aforementioned databases.

1. We handsearched the following relevant conference proceedings, which had not already been searched by the Cochrane Stroke Group.
   a. 3rd, 4th, 5th, 6th and 7th World Congress of NeuroRehabilitation (2002, 2006, 2008, 2010, 2012, 2014, 2016 and 2018).
   b. 1st, 2nd, 3rd, 4th, 5th and 6th World Congress of Physical and Rehabilitation Medicine (2001, 2003, 2005, 2007, 2009, 2011, 2013, 2015, 2017 and 2019).
   c. Deutsche Gesellschaft für Neurotraumatologie und Klinische Neurorehabilitation (2001 to 2019).
   d. Deutsche Gesellschaft für Neurologie (2000 to 2019).
   e. Deutsche Gesellschaft für Neurorehabilitation (1999 to 2019).
   f. Asian Oceania Conference of Physical and Rehabilitation Medicine (2008, 2010, 2012, 2014, 2017 and 2019).
2. We screened reference lists from relevant reviews, articles and textbooks.
3. We contacted authors of identified trials and other researchers in the field.
4. We used Science Citation Index Cited Reference Search for forward tracking of important articles.
5. We contacted the following equipment manufacturers (June 2015).
   a. Activatek, Salt Lake City, USA (www.activatekinc.com)
   b. Changsha Zhineng Electronics, Changsha City, Hunan, China (www.cszhineng.diytrade.com)
   c. DJO Global, Vista, USA (www.djoglobal.com)
   d. Grindhouse (www.grindhousewetware.com)
   e. Magstim, Spring Gardens, UK (www.magstim.com)
   f. Neuroconn, Ilmenau, Germany (www.neuroconn.de)
   g. Neuroelectrics, Barcelona, Spain (www.neuroelectrics.com)
   h. Newronika, Milano, Italy (www.newronika.it)
   i. Soterix Medical, New York City, USA (www.soterixmedical.com)
   j. Trans Cranial Technologies, Hong Kong (www.trans-cranial.com)

Data collection and analysis

Selection of studies

One review author (BE) read the titles and abstracts of records identified by the electronic searches and eliminated obviously irrelevant studies. We retrieved the full text articles of the remaining studies, and two review authors (JK and BE) independently ranked the studies as relevant, possibly relevant or irrelevant according to our inclusion criteria (types of studies, participants and aims of interventions). Two review authors (JM and MP) then examined whether the possibly relevant publications fit the population, intervention, comparison, outcome (PICO) strategy of our study question. We included all trials rated as relevant, or possibly relevant, and excluded all trials ranked as irrelevant. We resolved disagreements by discussion with all review authors. If we needed further information to resolve disagreements concerning including or excluding a study, we contacted the trial authors and requested the required information. We recorded the selection process in sufficient detail to complete a PRISMA flow diagram (Moher 2009), and listed in the Characteristics of excluded studies table all studies that did not match our inclusion criteria regarding types of studies, participants and aims of interventions.

Data extraction and management

Two review authors (BE and JM) independently extracted trial and outcome data from the selected trials. If one of the review authors was involved in an included trial, another review author extracted trial and outcome data from that trial. In accordance with the 'Risk of bias' tool implemented in Review Manager 5.3 (RevMan 2014) and Review Manager Web, we used a standard data extraction sheet to extract data on:

1. methods of random sequence generation;
2. methods of allocation concealment;
3. blinding of assessors;
4. use of an intention-to-treat (ITT) analysis;
5. adverse effects and dropouts;
6. important differences in prognostic factors;
7. participants (country, number of participants, age, gender, type of stroke, time from stroke onset to study entry and inclusion and exclusion criteria);
8. comparison (details of interventions in treatment and control groups, duration of treatment and details of cointerventions in the groups);
9. outcomes; and
10. investigators' time point of measurement.

Further, we extracted data on initial ADL ability or initial functional ability, or both.

BE and JM checked the extracted data for agreement. If necessary, we contacted trialists to obtain more information.

Assessment of risk of bias in included studies

Two review authors (JM and MP) independently assessed the risk of bias in the included trials, according to Chapter 8 of the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2011a). We assessed the risk of bias according to the following domains.

1. Random sequence generation
2. Allocation concealment
3. Blinding of participants and personnel
4. Blinding of outcome assessment
5. Incomplete outcome data
6. Selective outcome reporting
7. Other bias

Two other review authors (JK and MP) checked the extracted data for agreement. All review authors discussed disagreements and, if necessary, sought arbitration by another review author. We judged each domain to be at high, low or unclear risk of bias. We provide a quote from the study report, together with a justification for our judgement, in the 'Risk of bias' table. We summarised the risk of bias judgements across different studies for each of the domains listed.

Measures of treatment effect

For all outcomes that were continuous data, we entered means and standard deviations (SDs). We calculated a pooled estimate of the mean difference (MD) with 95% confidence intervals (CIs). If studies did not use the same outcomes, we calculated standardised mean differences (SMDs) instead of MDs. For all binary outcomes, we calculated risk ratios (RRs) with 95% CIs. Where different scales measured the same outcome, with some using higher values to indicate better performance, and others using lower values, we ensured a consistent direction of the effect across all outcome measurements by multiplying the values of the corresponding scales by -1.

For all statistical comparisons, we used the current version of Review Manager 5 (RevMan 2014) and Review Manager Web.

Unit of analysis issues

There were no unit of analysis issues. If studies did not used parallel group designs, e.g. cross-over RCTs, we only considered the outcomes between groups at the pre-crossover period.

Dealing with missing data

In case of missing data we extracted data from diagrams or contacted study authors to acquire missing data. If median values and interquartile ranges (IQR) were provided, we estimated their corresponding mean and standard deviation following the approach of Wan 2014.

Assessment of heterogeneity

We used the I^2 statistic to assess heterogeneity. We used a random-effects model, regardless of the level of heterogeneity. Thus, when heterogeneity occurred, we could not violate the preconditions of a fixed-effect model approach.

We considered $I^2 > 50\%$ as representing substantial heterogeneity. If $I^2 > 50\%$, we explored the individual trial characteristics to identify potential sources of heterogeneity.

Assessment of reporting biases

We tried to minimise reporting bias by using a sensitive search strategy, and by searching for studies in all languages, and by handsearching. Furthermore, we created funnel plots and examined them by visual inspection.

Data synthesis

We undertook meta-analysis only if we judged participants, interventions, comparisons and outcomes to be sufficiently similar to ensure an answer that is clinically meaningful. If more than one active or sham or control group investigated the same content, we combined these into one group each (e.g. if two sham control groups were included, we combined them into a single sham group for comparison with the active group).

Subgroup analysis and investigation of heterogeneity

If at least two studies were available for each group (tDCS/sham), we conducted planned analyses of the following subgroups for our primary outcome of ADL.

1. Duration of illness: acute/subacute phase (the first week after stroke and the second to the fourth week after stroke, respectively) versus the postacute phase (from the first to the sixth month after stroke) versus the chronic phase (more than six months after stroke).
2. Type of stimulation: cathodal versus anodal and position of electrodes/location of stimulation.
3. Type of control intervention: active (e.g. conventional therapy) versus passive (sham tDCS or no intervention).

All stratified (subgroup) analyses were accompanied by appropriate tests for interaction (statistical tests for subgroup differences as described in the *Cochrane Handbook* (Higgins 2011b), as implemented in Review Manager 5 (RevMan 2014).

Sensitivity analysis

We incorporated a post hoc sensitivity analysis for methodological quality to test the robustness of our results for our primary outcome ADL. We analysed concealed allocation, blinding of assessors, and ITT.

Summary of findings and assessment of the certainty of the evidence

We created four 'Summary of findings' tables using the following outcomes (two comparisons (tDCS versus sham and tDCS versus active control) at the end of intervention period and at the end of follow-up (i.e. three months or longer), respectively).

1. Primary outcome measure: ADL. Measures of activities of daily living. Scale from: 0 to infinity
2. Secondary outcome measure: upper extremity function. Clinical measures of upper extremity function. Scale from: 0 to infinity
3. Secondary outcome measure: lower extremity function. Clinical measures of lower extremity function. Scale from: 0 to infinity
4. Secondary outcome measure: muscle strength. Clinical measures of muscle strength. Scale from: 0 to infinity
5. Secondary outcome measure: cognitive abilities. Clinical measures of cognitive abilities. Scale from: 0 to infinity
6. Secondary outcome measure: hemispatial neglect. Clinical measures of hemispatial neglect. Scale from: 0 to infinity
7. Secondary outcome measure: dropouts, adverse events and deaths (during the intervention period only). Number of adverse events, dropouts and deaths during the intervention period

We used the five GRADE considerations (study limitations, consistency of effect, imprecision, indirectness and publication bias) to assess the quality of a body of evidence as it relates to the studies which contribute data to the meta-analyses for the prespecified outcomes (Atkins 2004). We used methods and recommendations described in Section 8.5 and Chapter 12 of the *Cochrane Handbook* (Higgins 2011c; Schünemann 2013) using GRADEproGDT software (GRADEproGDT). We justified all decisions

to downgrade the quality of studies using footnotes, and we made comments to aid the reader's understanding of the review where necessary.

RESULTS

Description of studies

We describe the included studies as follows.

Results of the search

2013 version

For the 2013 version of this review, we identified 6226 potentially relevant trials through electronic searching; we considered 92 full papers and included 15 trials with 455 participants.

2016 version

For the 2016 version, we identified a total of 2295 new records through the searches. After screening titles and abstracts, we obtained the full-text of 52 new articles. After further assessment, we determined that 17 new studies met the review's inclusion criteria.

2020 version

In this update, we identified a total of 3407 new records through the searches. After screening titles and abstracts, we obtained the full-text of 198 new articles. After further assessment, we determined that 35 new studies met the review inclusion criteria, and four studies are awaiting classification, as more information is required. We identified 61 ongoing pilot and large-scale randomised trials.

The flow of references is shown in Figure 1.

Figure 1. Study flow diagram. Please note that the number of full-texts is not necessarily equal to the number of studies (e.g. the studies Di Lazzaro 2014a and Di Lazzaro 2014b have been presented in a single full-text. Moreover there often are several full-texts of a single trial (e.g. as is the case for Hesse 2011 or Nair 2011).

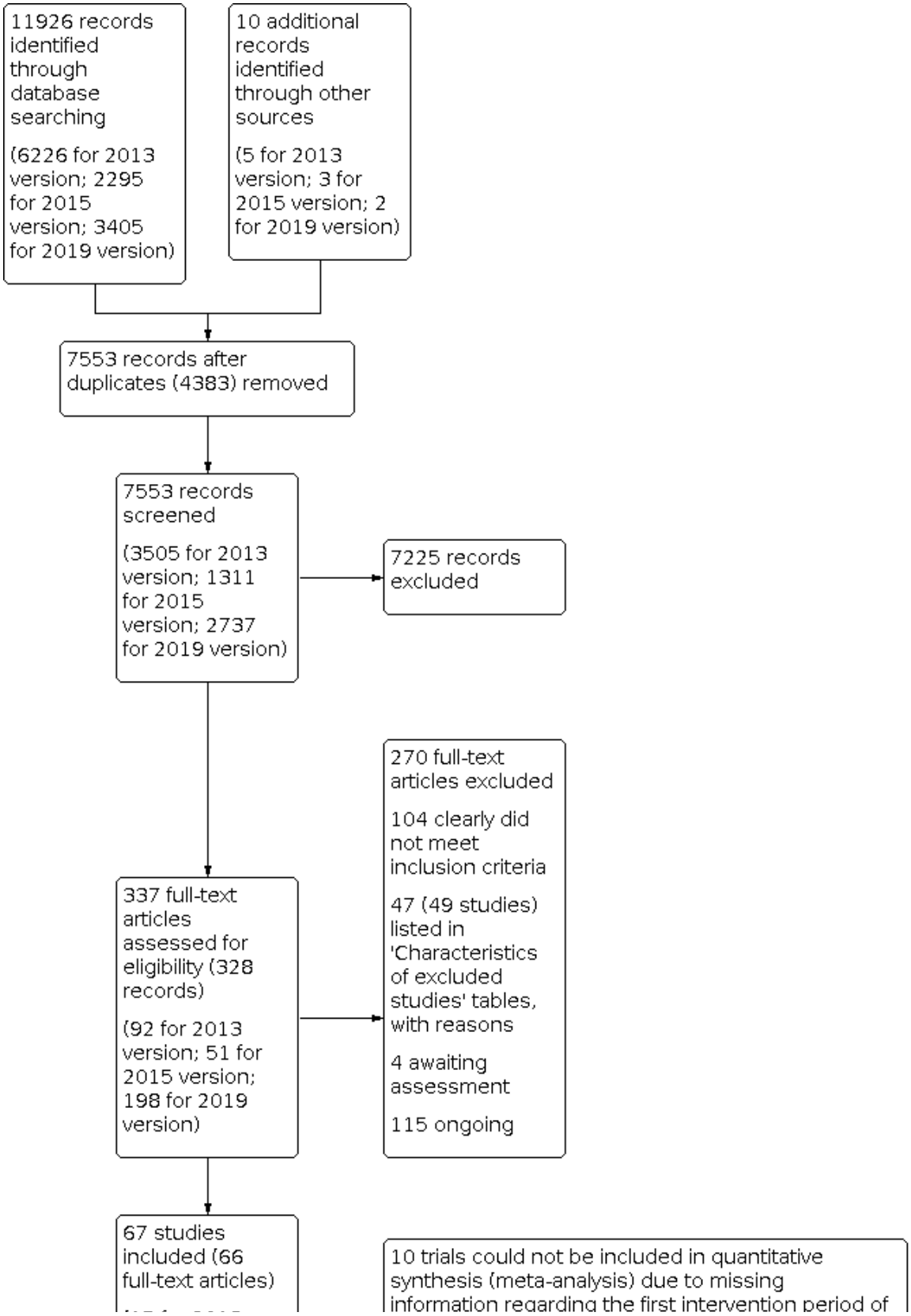
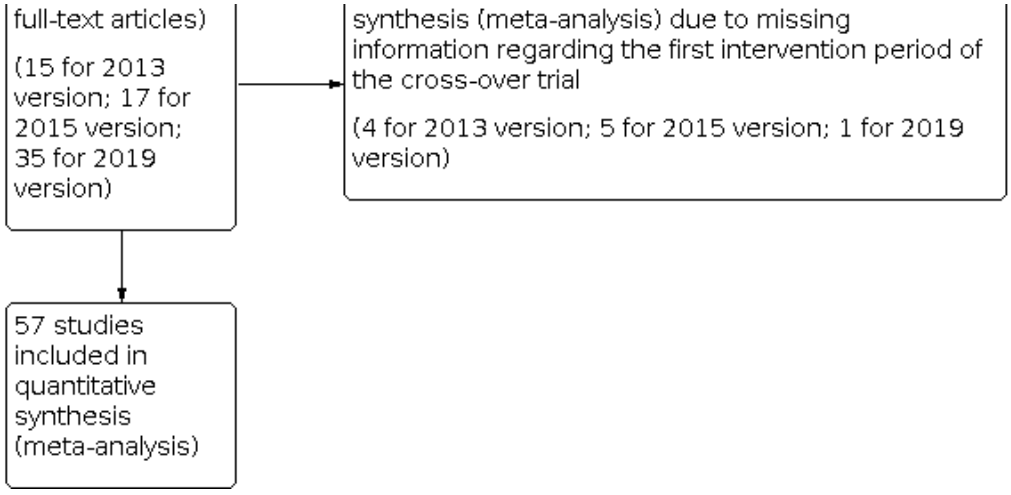


Figure 1. (Continued)



Included studies

Design

We included 67 studies involving a total of 1729 participants in our qualitative analysis (see Characteristics of included studies). All studies investigated the effects of tDCS versus sham tDCS, except Bang 2015; Cha 2014; Cho 2017; Hamoudi 2018; Hathaiareerug 2019; Lee 2014; Park 2015 and Qu 2009, which compared tDCS with an active comparator. Fifteen trials with 183 participants were randomly assigned cross-over trials (Au-Yeung 2014; Boggio 2007a; D'Agata 2016; Fregni 2005a; Fusco 2013a; Klomjai 2018; Jo 2008a; Kang 2008b; Kim 2009; Ko 2008a; Mahmoudi 2011; Manji 2018; Sohn 2013; Sunwoo 2013a; Utarapichat 2018), whereas the remaining 52, with 1546 participants, were RCTs.

Sample sizes

The sample sizes of included studies ranged from four in Boggio 2007a to 96 in Hesse 2011, with a mean (SD) sample size of 26 (18). The median sample size was 20.

Setting

Seventeen of the included studies were conducted in the Republic of Korea, 10 in Italy, seven in the USA, six in China, four in Brazil, three in Thailand, two in Japan, two in Germany, one in Iran, one in Egypt, one in the UK, one in Singapore, one in Belgium, one in Switzerland, and one in Serbia. In three studies, the country was not stated clearly.

Participants

The proportion of participants with ischaemic stroke ranged from 36% in Sohn 2013 to 100% in Fusco 2014. The mean age in the experimental groups ranged from 43 years in Bolognini 2011 to 70 years in Kang 2008b, and from 45 years in Qu 2009 to 75 years in the control groups (Boggio 2007a). The proportion of women participating in the included studies ranged from 0% in Au-Yeung 2014 and Boggio 2007a to 75% in Danzl 2012. See Table 2 for a comprehensive summary of participant characteristics.

Interventions

The experimental groups received anodal stimulation (A-tDCS) (Allman 2016; Andrade 2017; Au-Yeung 2014; Boggio 2007a; Bolognini 2011; Cha 2014; Chang 2015; Chelette 2014; Cunningham 2015; Danzl 2012; Fregni 2005a; Fusco 2013a; Geroin 2011; Hamoudi 2018; Hesse 2011; Ilić 2016; Jo 2008a; Kang 2008b; Khedr 2013; Kim 2009; Kim 2010; Kim 2016; Ko 2008a; Koo 2018; Mahmoudi 2011; Manji 2018; Mazzoleni 2019; Mortensen 2016; Park 2013; Park 2015; Picelli 2015; Rossi 2013; Seo 2017; Shaheiwola 2018; Sik 2015; Sohn 2013; Sunwoo 2013a; Tedesco Triccas 2015b; Utarapichat 2018; Viana 2014; Wang 2014; Wong 2015; Yi 2016); cathodal stimulation (C-tDCS) (Au-Yeung 2014; Boggio 2007a; Chelette 2014; Cho 2017; Fregni 2005a; Fusco 2013a; Fusco 2014; Hesse 2011; Khedr 2013; Kim 2010; Lee 2014; Mahmoudi 2011; Nair 2011; Nicolo 2017; Qu 2009; Qu 2017; Rabadi 2017; Wu 2013a; Yi 2016); or dual-tDCS (anodal plus cathodal stimulation simultaneously) (Ang 2012; Bang 2015; Chelette 2014; D'Agata 2016; Di Lazzaro 2014a; Di Lazzaro 2014b; Fusco 2013a; Hathaiareerug 2019; Klomjai 2018; Lindenberg 2010; Mahmoudi 2011; Salazar 2019; Sik 2015; Straudi 2016; Sunwoo 2013a; Tahtis 2012). The control groups of all but eight included studies received sham tDCS. The remaining eight studies received physical therapy, occupational therapy, mirror therapy or virtual reality as a control intervention (Bang 2015; Cha 2014; Cho 2017; Hamoudi 2018; Hathaiareerug 2019; Lee 2014; Park 2015 Qu 2009). See Table 3 for a comprehensive summary of intervention characteristics, dropouts and adverse events.

Outcomes

Widely used outcomes for activities were the Barthel Index (BI, 13 of 67 studies, 20%) and the Motor Activity Log (MAL, seven of 67 studies, 11%). Widely used outcomes for upper extremity function were the Upper Extremity Fugl-Meyer Score (UE-FM, 30 of 67 studies, 45%), the Jebsen-Taylor Test (JTT, nine of 67 studies, 13 %) and the Action Research Arm Test (ARAT, eight of 67 studies, 12%). Fifty-six studies (84%) reported data on adverse events or drop-outs.

We excluded 10 of the included trials from quantitative syntheses (meta-analyses) because of missing information regarding the first

intervention period of the cross-over trial (Au-Yeung 2014; Fregni 2005a; Jo 2008a; Kang 2008b; Kim 2009; Klomjai 2018; Ko 2008a; Mahmoudi 2011; Sohn 2013; Sunwoo 2013a).

Excluded studies

We excluded 49 trials from qualitative assessment, mainly because they were not RCTs, or because their outcomes did not measure function, ADL or cognition (see Characteristics of excluded studies).

Risk of bias in included studies

We provided information about the risk of bias in Characteristics of included studies. To complete the rating of methodological quality, we contacted all principal investigators of the included trials and of trials awaiting classification to request further information about methodological issues, if necessary. We made contact via letter and email, including email reminders once a month if we received no response. Some trialists provided all requested information, and some did not answer our requests. We used the 'Risk of bias' tool, as implemented in Review Manager 5.3, to assess risk of bias according to the aspects listed under Methods. A detailed description of risk of bias can be found in Characteristics of included studies. Information on risk of bias on study level and outcome level is provided in Figure 2 and in Figure 3.

Figure 2. Risk of bias summary: review authors' judgements about each risk of bias item for each included study.

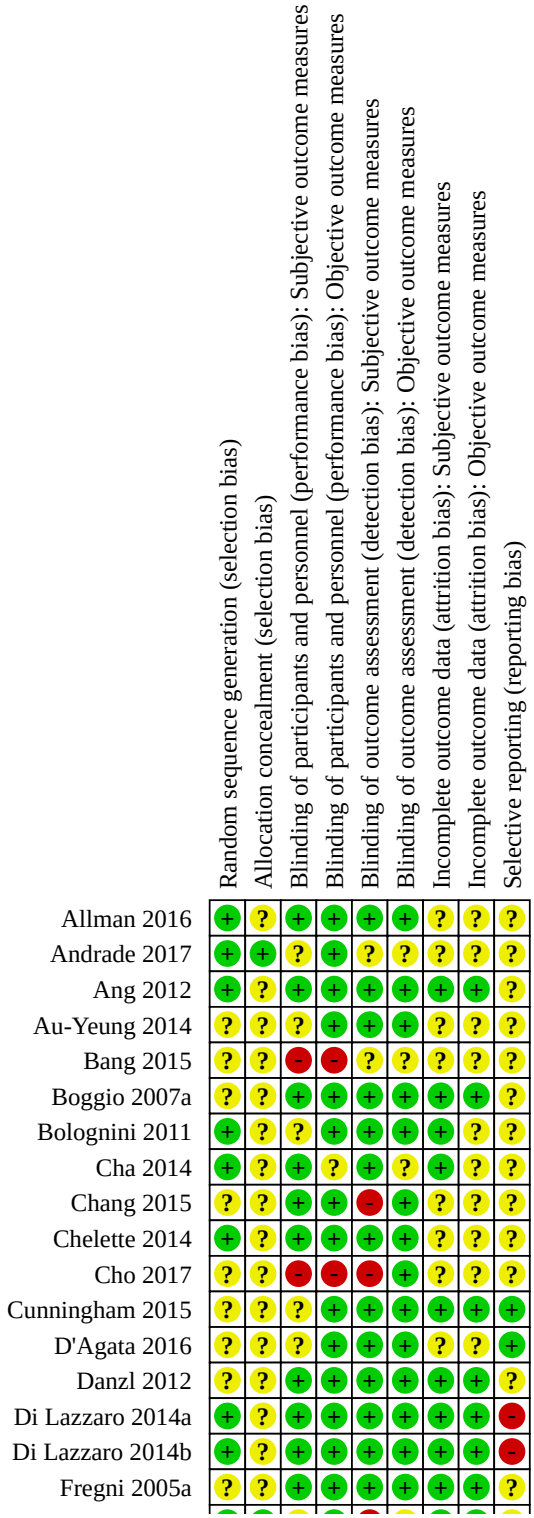
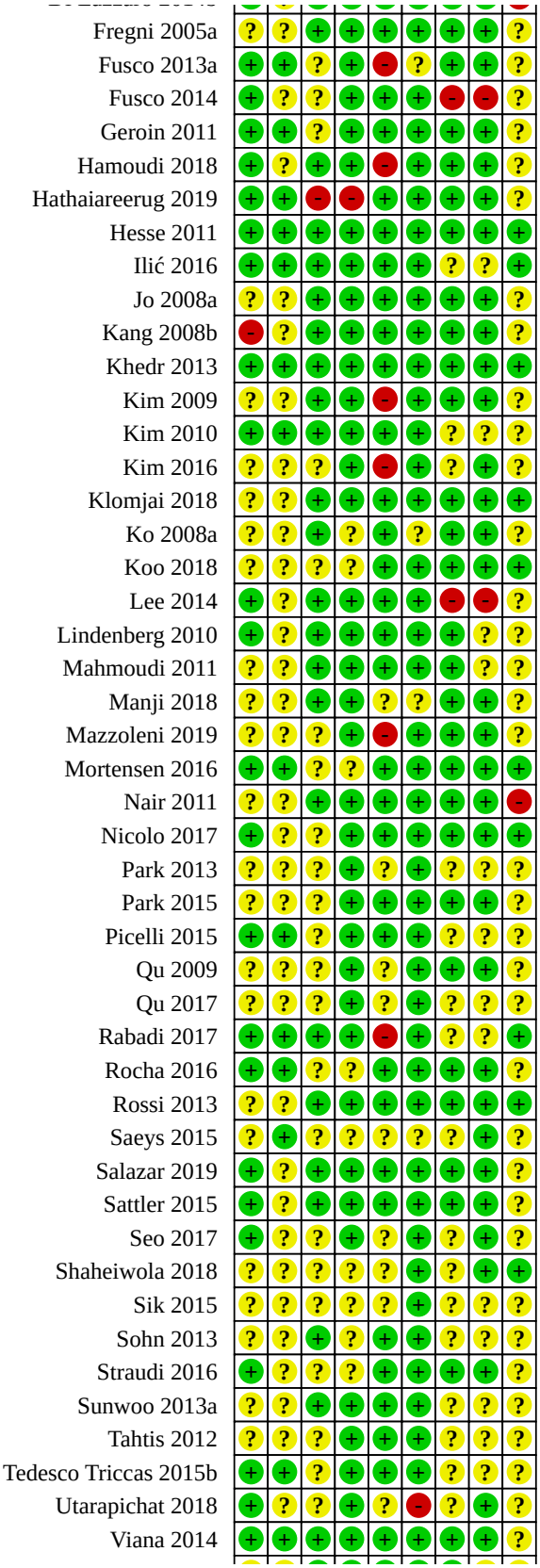


Figure 2. (Continued)



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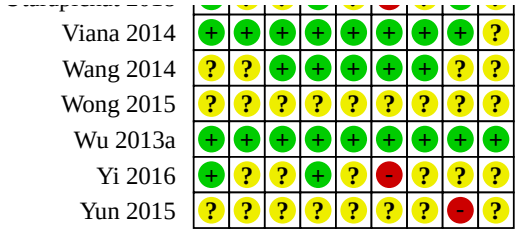
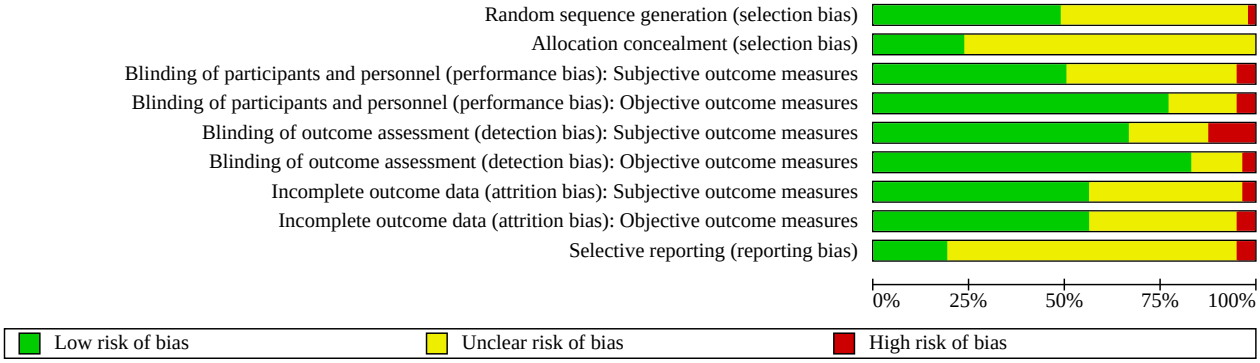


Figure 3. Risk of bias graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.



Allocation

Thirty-two of the 67 included studies (48%) were at low risk of bias for sequence generation, whereas sixteen studies (24%) were at low risk of bias for allocation concealment.

Blinding

We deemed 34 of the 67 included studies (50%) to be at low risk of bias for blinding of participants and personnel for subjective outcomes and 52 studies (76%) for objective outcomes, respectively; three studies were at high risk of bias in this domain (Bang 2015; Cho 2017; Hathaiareerug 2019). Forty-five studies (66%) were at low risk of bias for blinding of outcome assessment for subjective and objective outcomes, whereas we determined 10 studies to have high risk of bias in this domain (Chang 2015; Cho 2017; Fusco 2013a; Hamoudi 2018; Kim 2009; Kim 2016; Mazzoleni 2019; Rabadi 2017; Utarapichat 2018; Yi 2016).

Incomplete outcome data

Thirty-eight of the 67 included studies (56%) were at low risk of bias for incomplete outcome data for objective and subjective outcomes, and three studies were at high risk of bias (Fusco 2014; Lee 2014; Yun 2015).

Selective reporting

Thirteen of the 67 included studies (38%) were at low risk of bias for selective outcome reporting, and three studies (5%) were at high risk of bias (Di Lazzaro 2014a; Di Lazzaro 2014b; Nair 2011).

Other potential sources of bias

We are not aware of other potential sources of bias.

Effects of interventions

See: **Summary of findings 1** tDCS versus any type of placebo or passive control intervention for improving activities of daily living, and physical and cognitive functioning at the end of intervention period, in people after stroke; **Summary of findings 2** tDCS versus any type of active control intervention for improving activities of daily living, and physical and cognitive functioning at the end of intervention period, in people after stroke; **Summary of findings 3** tDCS versus any type of placebo or passive control intervention for improving activities of daily living, and physical and cognitive functioning at the end of follow-up, in people after stroke; **Summary of findings 4** tDCS versus any type of active control intervention for improving activities of daily living, and physical and cognitive functioning at the end of follow-up, in people after stroke

Fifty-seven of the 67 included studies (85%) were included in the meta-analysis (Allman 2016; Andrade 2017; Ang 2012; Bang 2015; Boggio 2007a; Bolognini 2011; Cha 2014; Chang 2015; Chelette 2014; Cho 2017; Cunningham 2015; D'Agata 2016; Danzl 2012; Di Lazzaro 2014a; Di Lazzaro 2014b; Fusco 2013a; Fusco 2014; Geroin 2011; Hamoudi 2018; Hathaiareerug 2019; Hesse 2011; Ilić 2016; Khedr 2013; Kim 2010; Kim 2016; Koo 2018; Lee 2014; Lindenberg 2010; Manji 2018; Mazzoleni 2019; Mortensen 2016; Nair 2011; Nicolo 2017; Park 2013; Park 2015; Picelli 2015; Qu 2009; Qu 2017; Rabadi 2017; Rocha 2016; Rossi 2013; Saeys 2015; Salazar 2019; Sattler 2015; Seo 2017; Shaheiwola 2018; Sik 2015; Straudi 2016;

Tahtis 2012; Tedesco Triccas 2015b; Utarapichat 2018; Viana 2014; Wang 2014; Wong 2015; Wu 2013a; Yi 2016; Yun 2015).

Comparison 1. tDCS versus any type of placebo or passive control intervention

Comparison 1.1 Primary outcome measure: ADL at the end of the intervention period

1.1.1 Studies presenting absolute values

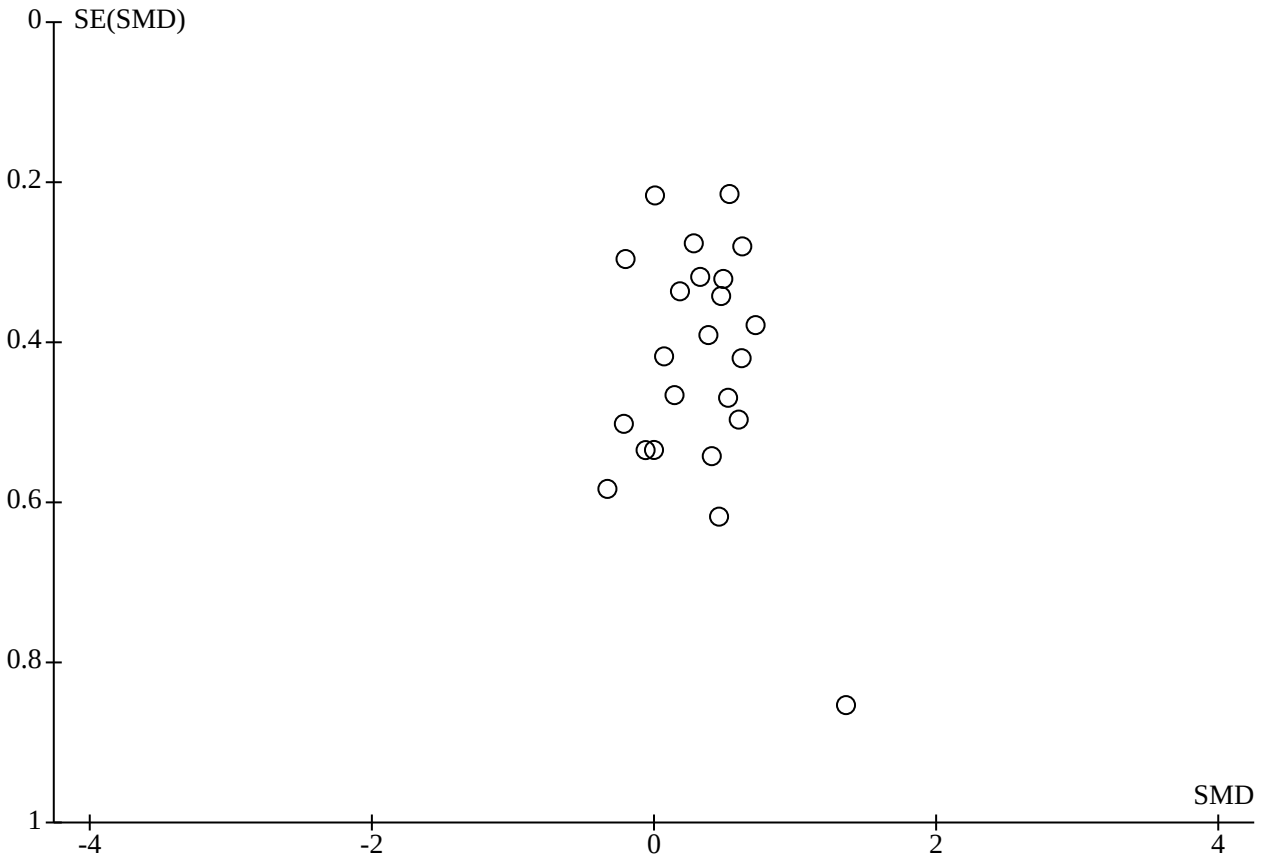
We found 19 studies with 686 participants examining the effects of tDCS on ADL (Bolognini 2011; Chelette 2014; Cunningham 2015; Di Lazzaro 2014a; Di Lazzaro 2014b; Hesse 2011; Khedr 2013; Kim 2010; Kim 2016; Koo 2018; Lee 2014; Nicolo 2017; Qu 2017; Rocha 2016; Straudi 2016; Tedesco Triccas 2015b; Wu 2013a; Yi 2016; Yun 2015). We found evidence of effect regarding ADL performance when we analysed the data with combined intervention groups, as stated in Methods (i.e. A-tDCS and/or C-tDCS versus sham tDCS; SMD 0.28, 95% CI 0.13 to 0.44; inverse variance method with random-effects model; moderate-quality evidence; Analysis 1.1; Summary of findings 1).

1.1.2 Studies presenting change scores

Four studies with 95 participants reported the effects of tDCS on ADL as change values relative to baseline (Andrade 2017; Danzl 2012; Fusco 2014; Rabadi 2017). Moderate-quality evidence suggests that there is evidence of an effect (SMD 0.48, 95% CI 0.02 to 0.95; inverse variance method with random-effects model; Analysis 1.1; Summary of findings 1).

The funnel plot of Analysis 1.1 can be found in Figure 4. By visual inspection, we concluded that there were no indications of substantial funnel plot asymmetry that would suggest the presence of publication bias.

Figure 4. Funnel plot of comparison: 1 Primary outcome measure: tDCS for improvement of ADL versus any type of placebo or control intervention, outcome: 1.1 ADL at the end of the intervention period, absolute values (BI points).



Comparison 1.2 Primary outcome measure: ADL until the end of follow-up, absolute values (at least three months after the end of the intervention period)

1.2.1 Studies presenting absolute values

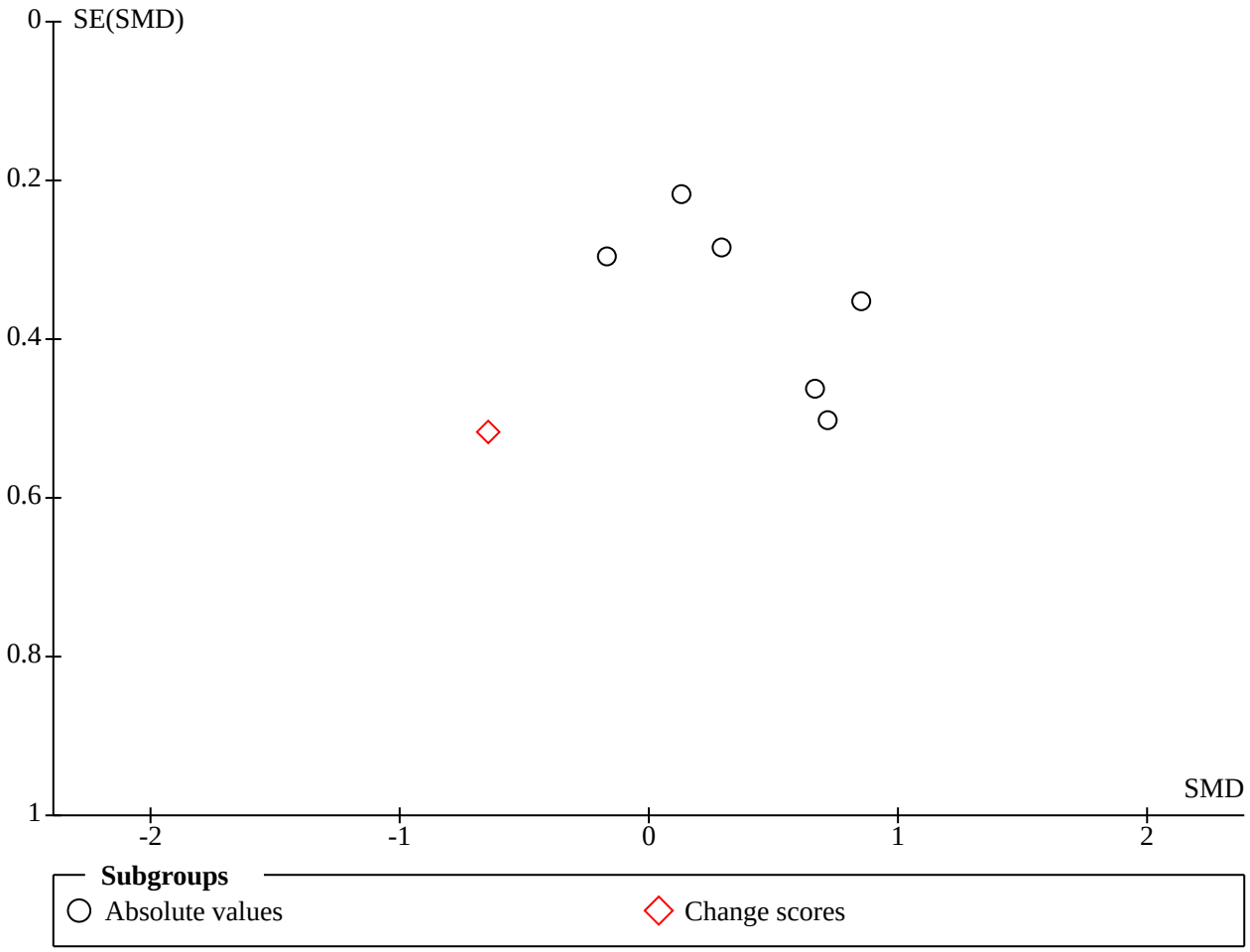
We included six studies with 269 participants (Di Lazzaro 2014b; Hesse 2011; Khedr 2013; Kim 2010; Rossi 2013; Tedesco Triccas 2015b); investigators measured the effects of tDCS on ADL at the end of follow-up. We found evidence of effect regarding ADL performance when we analysed the data with combined intervention groups (SMD 0.31, 95% CI 0.01 to 0.62; inverse variance method with random-effects model; moderate-quality evidence; Analysis 1.2; Summary of findings 3).

1.2.2 Studies presenting change scores

One study with 16 participants reported the effects of tDCS on ADL as change values relative to baseline (Rabadi 2017). There is low-quality evidence that there is no evidence of an effect (SMD -0.64, 95% CI -1.66 to 0.37; inverse variance method with random-effects model; Analysis 1.2; Summary of findings 3).

By visual inspection of the funnel plot of Analysis 1.2, we concluded that there were no indications of substantial asymmetry that would suggest the presence of publication bias (Figure 5).

Figure 5. Funnel plot of comparison: 1 tDCS versus any type of placebo or passive control intervention, outcome: 1.2 Primary outcome measure: ADL until the end of follow-up.



Comparison 1.3 Secondary outcome measure: upper extremity function at the end of the intervention period

1.3.1 Studies presenting absolute values

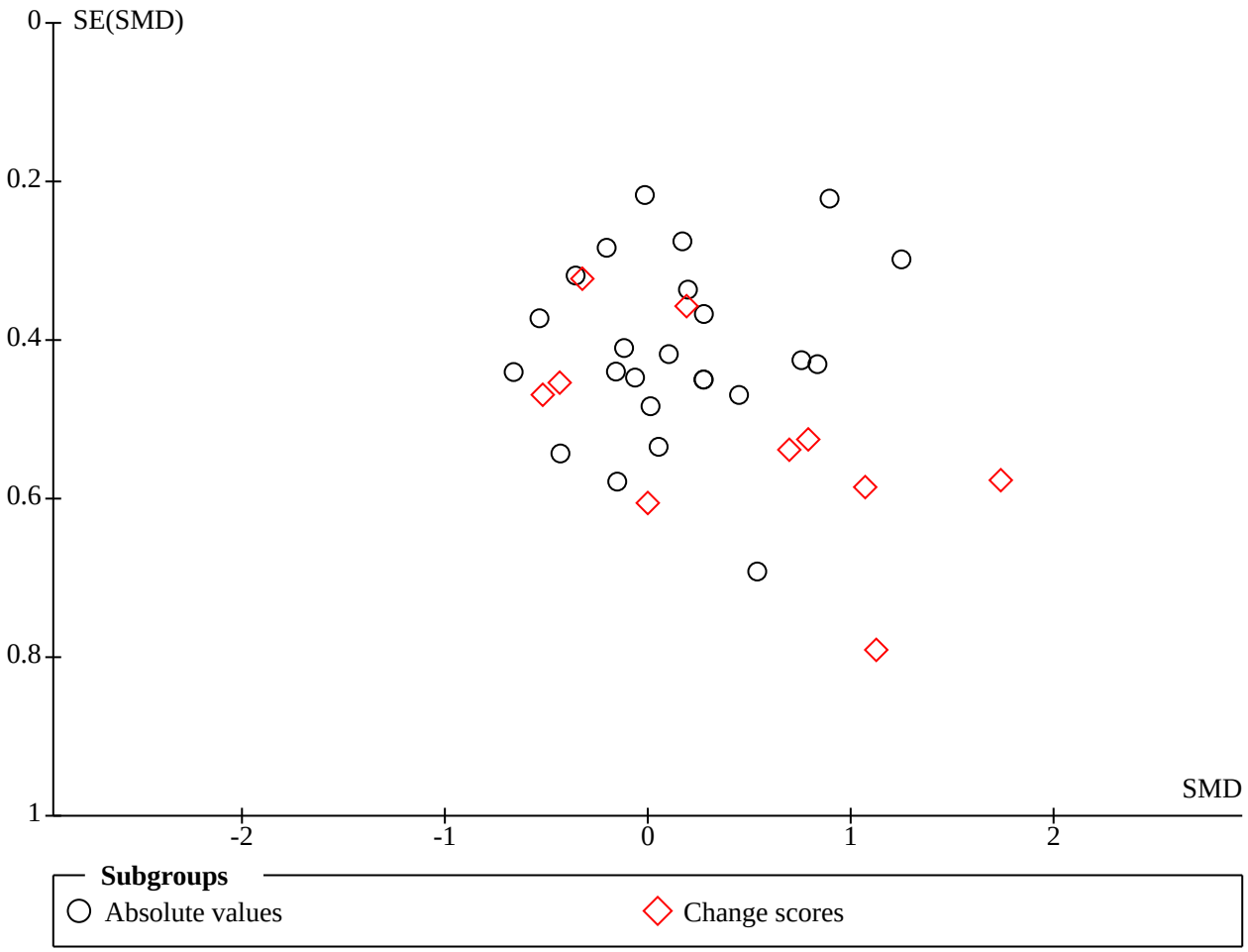
Twenty-four trials with a total of 792 participants examined upper limb function at the end of the intervention period and provided absolute values for the outcome (Allman 2016; Andrade 2017; Bolognini 2011; Chelette 2014; Cunningham 2015; Di Lazzaro 2014a; Di Lazzaro 2014b; Fusco 2013a; Hesse 2011; Ilić 2016; Kim 2010; Koo 2018; Lee 2014; Lindenberg 2010; Nicolo 2017; Qu 2017; Rocha 2016; Rossi 2013; Salazar 2019; Shaheiwola 2018; Straudi 2016; Tedesco Triccas 2015b; Viana 2014; Wu 2013a). There was no evidence of effect of tDCS when we analysed the data with combined intervention groups (SMD 0.17, 95% CI -0.05 to 0.38; inverse variance method with random-effects model; moderate-quality evidence; Analysis 1.3; Summary of findings 1).

1.3.2 Studies presenting change scores

We included 10 studies with 193 participants (Ang 2012; D'Agata 2016; Fusco 2014; Hamoudi 2018; Mazzoleni 2019; Mortensen 2016; Nair 2011; Rabadi 2017; Sattler 2015; Wang 2014). Investigators measured the effects of tDCS on upper limb function at the end of the intervention period and provided absolute values for the outcome. There was no evidence of effect of tDCS when we analysed the data with combined intervention groups (SMD 0.33, 95% CI -0.12 to 0.79; inverse variance method with random-effects model; low-quality evidence; Analysis 1.3; Summary of findings 1).

By visual inspection of the funnel plot of Analysis 1.3, we concluded that there were some indications of asymmetry in the studies presenting change scores, suggesting that publication bias may be present (Figure 6).

Figure 6. Funnel plot of comparison: 1 tDCS versus any type of placebo or passive control intervention, outcome: 1.3 Secondary outcome measure: upper extremity function at the end of the intervention period.



Comparison 1.4 Secondary outcome measure: upper extremity function to the end of follow-up (at least three months after the end of the intervention period)

1.4.1 Studies presenting absolute values

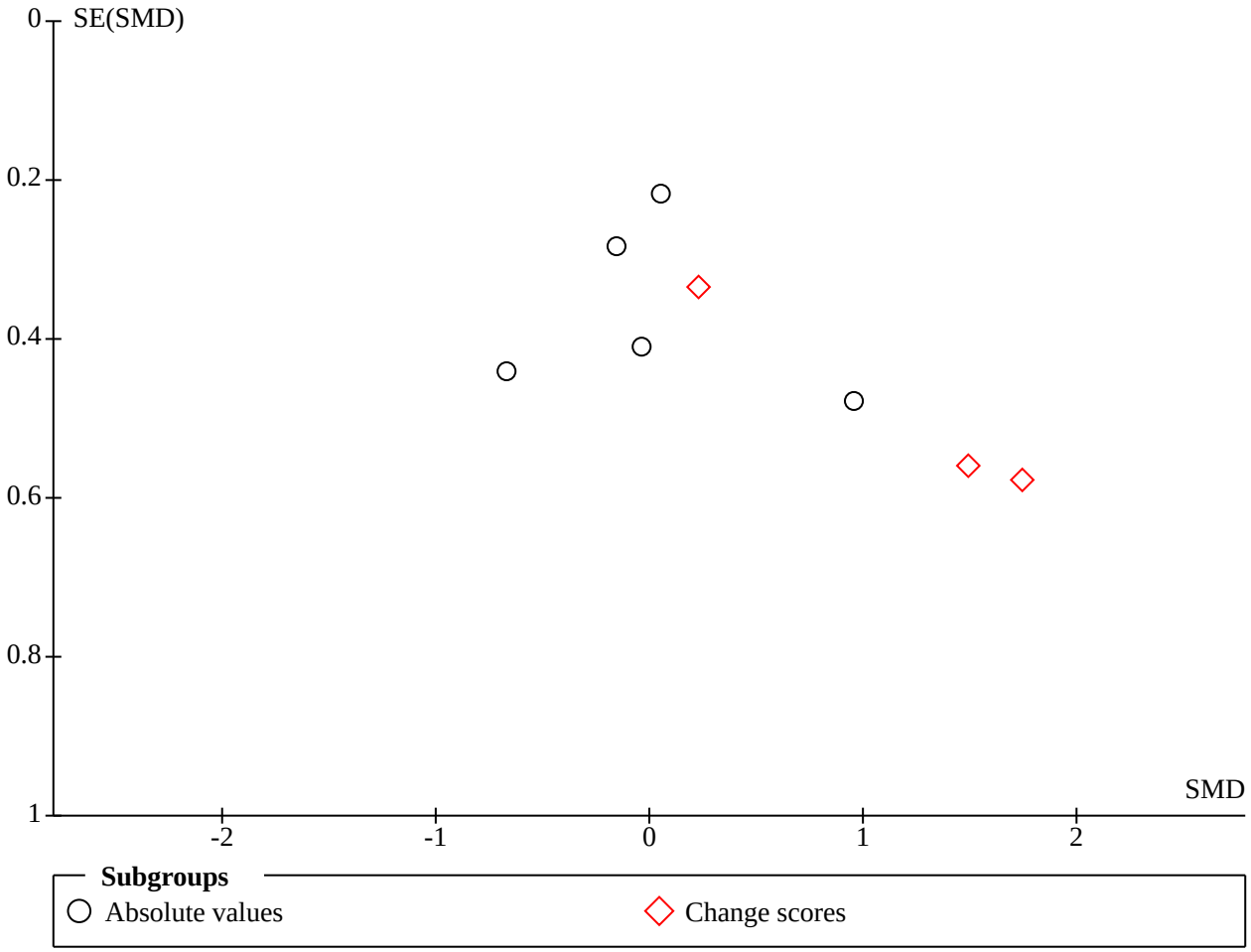
Five studies with a total of 211 participants examined upper extremity function at the end of follow-up and reported absolute values for this outcome (Allman 2016; Di Lazzaro 2014b; Hesse 2011; Rossi 2013; Tedesco Triccas 2015b). We found no evidence of effect regarding upper extremity function when we analysed the data with combined intervention groups (i.e. A-tDCS and/or C-tDCS versus sham tDCS; SMD -0.00, 95% CI -0.39 to 0.39; inverse variance method with random-effects model; moderate-quality evidence; Analysis 1.4; Summary of findings 3).

1.4.2 Studies presenting change scores

We included three studies with 72 participants (D'Agata 2016; Hamoudi 2018; Kim 2010); the investigators measured the effects of tDCS on upper limb function at the end of follow-up and provided change values for the outcome. There was evidence of effect of tDCS when we analysed the data with combined intervention groups (SMD 1.07, 95% CI 0.04 to 2.11; inverse variance method with random-effects model; low-quality evidence; Analysis 1.4; Summary of findings 3).

By visual inspection of the funnel plot of Analysis 1.4, we concluded that there were some indications of asymmetry in the studies presenting change scores, suggesting that publication bias may be present (Figure 7).

Figure 7. Funnel plot of comparison: 1 tDCS versus any type of placebo or passive control intervention, outcome: 1.4 Secondary outcome measure: upper extremity function to the end of follow-up.



Comparison 1.5 Secondary outcome measure: lower extremity function at the end of the intervention period

1.5.1 Studies presenting absolute values

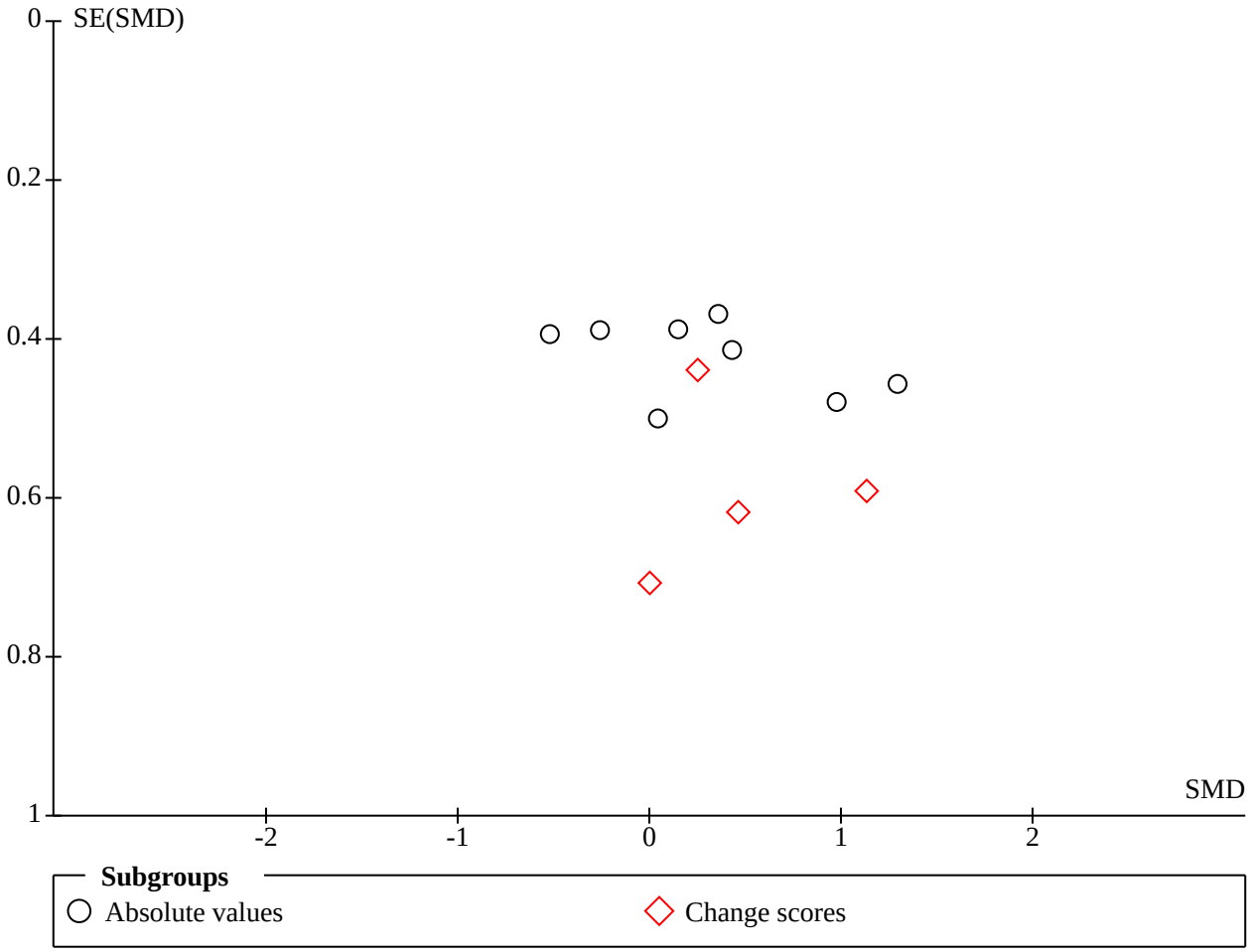
Eight studies with a total of 204 participants examined lower extremity function at the end of the intervention period and reported absolute values for this outcome (Cha 2014; Chang 2015; Geroin 2011; Koo 2018; Manji 2018; Park 2015; Picelli 2015; Yi 2016). We found no evidence of effect regarding lower extremity function when we analysed the data with combined intervention groups (i.e. A-tDCS and/or C-tDCS versus sham tDCS; SMD 0.28, 95% CI -0.12 to 0.69; inverse variance method with random-effects model; moderate-quality evidence; Analysis 1.5; Summary of findings 1).

1.5.2 Studies presenting change scores

Four studies with a total of 54 participants examined lower extremity function at the end of the intervention period and reported change values for this outcome (Danzl 2012; Fusco 2014; Seo 2017; Tahtis 2012). We found no evidence of effect regarding lower extremity function when we analysed the data with combined intervention groups (i.e. A-tDCS and/or C-tDCS versus sham tDCS; SMD 0.46, 95% CI -0.09 to 1.01; inverse variance method with random-effects model; moderate-quality evidence; Analysis 1.5; Summary of findings 1).

By visual inspection of the funnel plot of Analysis 1.5, we concluded that there were no indications for publication bias (Figure 8).

Figure 8. Funnel plot of comparison: 1 tDCS versus any type of placebo or passive control intervention, outcome: 1.5 Secondary outcome measure: lower extremity function at the end of the intervention period.



There were no studies which examined the effects of tDCS on lower extremity function at follow-up (i.e. after at least three months).

Comparison 1.6 Secondary outcome measure: muscle strength at the end of the intervention period

1.6.1 Studies presenting absolute values

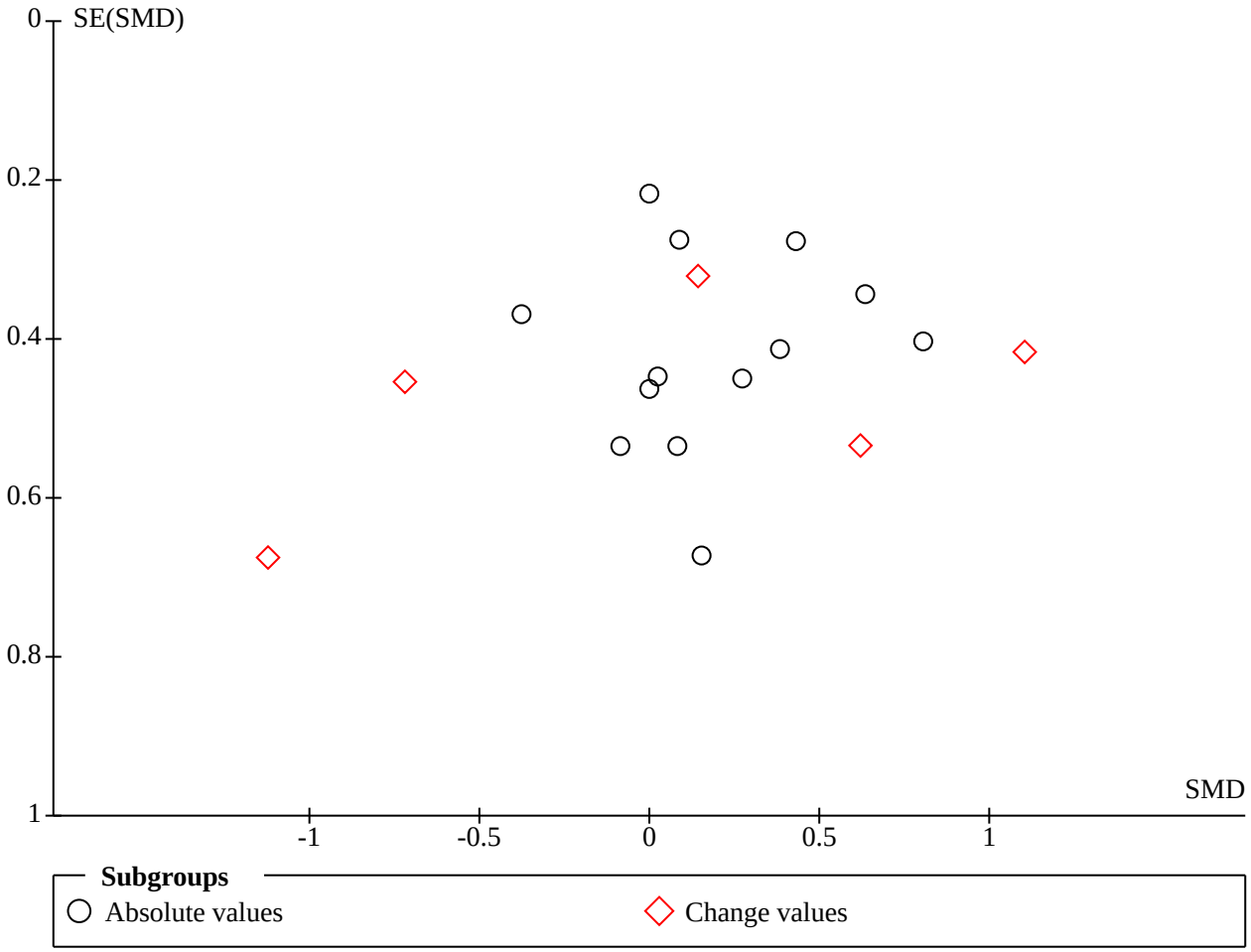
We included 13 studies with 437 participants (Andrade 2017; Bolognini 2011; Di Lazzaro 2014a; Di Lazzaro 2014b; Fusco 2013a; Hesse 2011; Khedr 2013; Koo 2018; Lee 2014; Picelli 2015; Rocha 2016; Salazar 2019; Viana 2014); investigators measured the effects of tDCS on muscle strength at the end of the intervention period and provided absolute values for the outcome. There was no evidence of effect of tDCS when we analysed the data with combined intervention groups (SMD 0.19, 95% CI -0.01 to 0.38; inverse variance method with random-effects model; high-quality evidence; Analysis 1.6; Summary of findings 1).

1.6.2 Studies presenting change scores

Five studies with a total of 116 participants examined muscle strength at the end of the intervention period and reported change values for this outcome (Fusco 2014; Geroin 2011; Mazzoleni 2019; Mortensen 2016; Seo 2017). We found no evidence of effect regarding muscle strength when we analysed the data with combined intervention groups (i.e. A-tDCS and/or C-tDCS versus sham tDCS; SMD 0.07, 95% CI -0.66 to 0.80; inverse variance method with random-effects model; moderate-quality evidence; Analysis 1.6; Summary of findings 1).

By visual inspection, the authors concluded that there were no indications of funnel plot asymmetry that would suggest the presence of publication bias in Analysis 1.6 (Figure 9).

Figure 9. Funnel plot of comparison: 1 tDCS versus any type of placebo or passive control intervention, outcome: 1.6 Secondary outcome measure: muscle strength at the end of the intervention period.

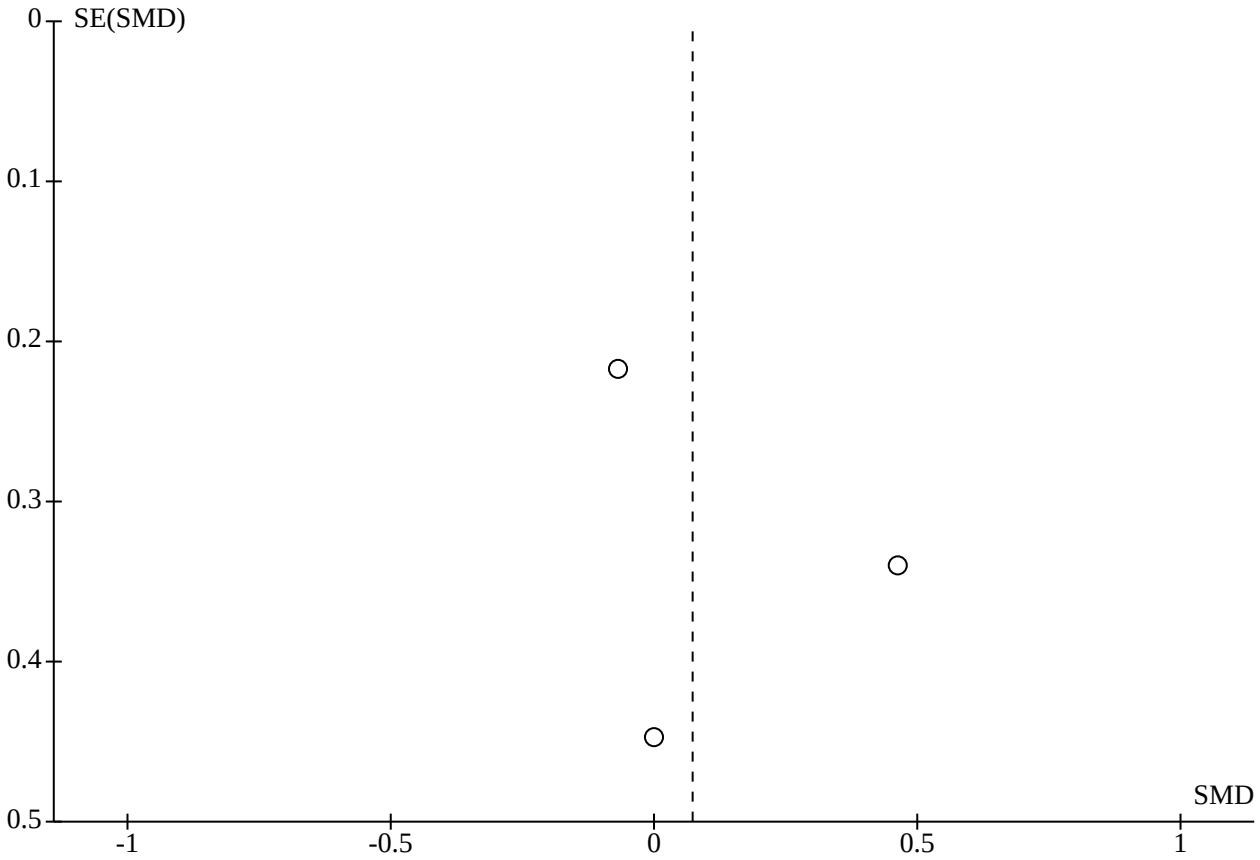


Comparison 1.7 Secondary outcome measure: muscle strength at the end of follow-up (at least three months after the end of the intervention period), absolute values

We included three studies with 156 participants (Di Lazzaro 2014b; Hesse 2011; Khedr 2013). Investigators measured the effects of tDCS on muscle strength at the end of follow-up and provided absolute values for the outcome. There was no evidence of effect of tDCS when we analysed the data with combined intervention groups (SMD 0.07, 95% CI -0.26 to 0.41; inverse variance method with random-effects model; moderate-quality evidence; Analysis 1.7; Summary of findings 3).

By visual inspection, the authors concluded that there were no indications of funnel plot asymmetry that would suggest the presence of publication bias in Analysis 1.7 (Figure 10).

Figure 10. Funnel plot of comparison: 1 tDCS versus any type of placebo or passive control intervention, outcome: 1.7 Secondary outcome measure: muscle strength at the end of follow-up.



Comparison 1.8 Secondary outcome measure: cognitive abilities at the end of the intervention period

There were two studies with 56 participants that examined the effects of tDCS on cognitive abilities (Park 2013; Yun 2015); investigators measured the effects of tDCS on cognitive impairment at the end of intervention and provided absolute values for the outcome. There was no evidence of effect of tDCS when we analysed the data with combined intervention groups (SMD 0.46, 95% CI -0.10 to 1.02; inverse variance method with random-effects model; low-quality evidence; Analysis 1.8; Summary of findings 1). We furthermore identified three randomised cross-over trials that examined the effects of tDCS on cognitive abilities, but data extraction was not possible due to missing information regarding the first intervention period (Au-Yeung 2014; Jo 2008a; Kang 2008b). However, each of the studies reported evidence of an effect in favour of tDCS regarding measures of attention. We did not identify any studies examining the effects of tDCS on cognitive abilities at follow-up.

Comparison 1.9: Secondary outcome measure: spatial neglect

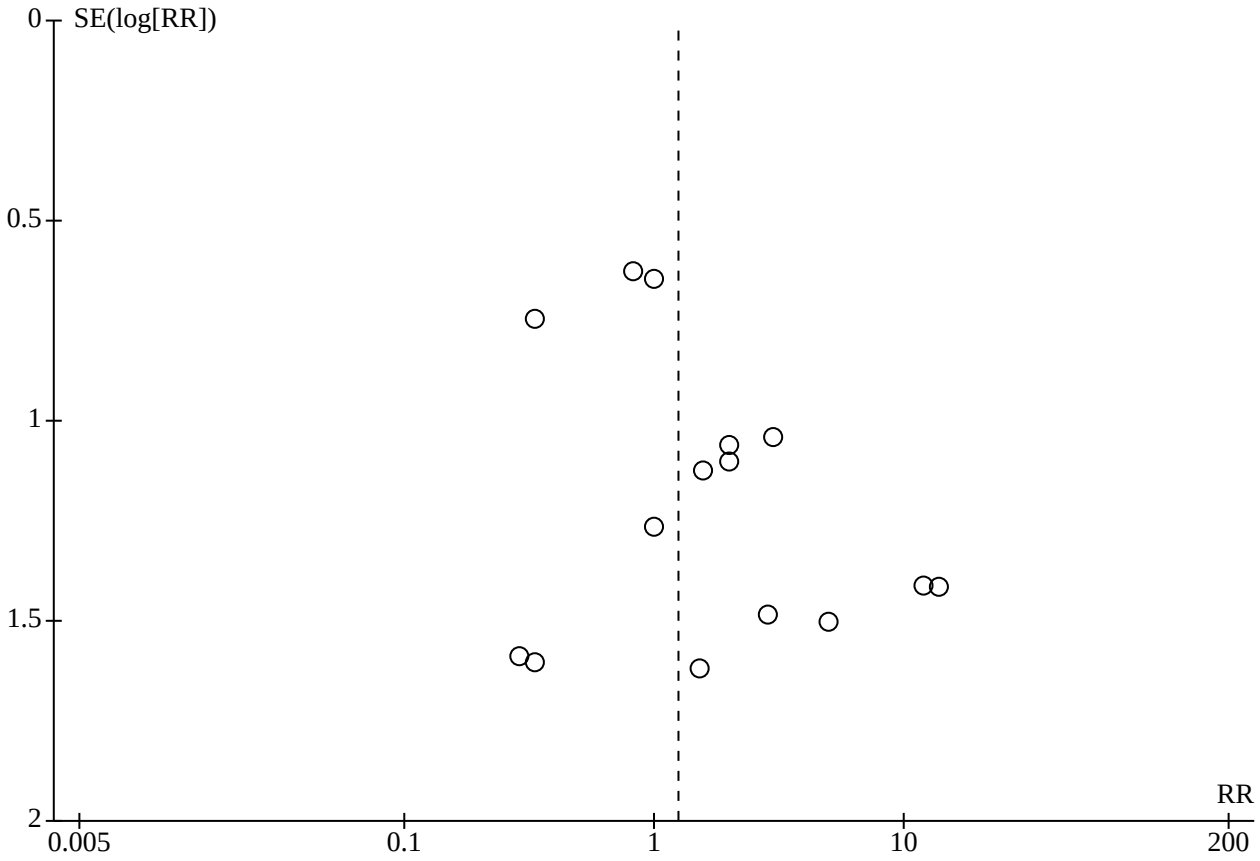
We identified one trial with 15 participants that examined the effects of tDCS on neglect, but data extraction was not possible due to missing information regarding the first intervention period (Ko 2008a). We included one study with 30 participants examining the effects of tDCS on spatial neglect (Yi 2016). This study reported improvement in neglect tests (MD 4.80, 95% CI 0.13 to 9.47; inverse variance method with random-effects model; very low-quality evidence). We did not identify any randomised studies examining the effects of tDCS on spatial neglect at follow-up (Analysis 1.9).

Comparison 1.10 Secondary outcome measure: dropouts, adverse events and deaths during the intervention period

Forty-eight out of 67 studies (74%) reported data on dropouts, and 36 out of 67 studies (55%) reported data on adverse events. In 27 of 67 studies (40%), dropouts, adverse events or deaths that occurred during the intervention period were reported (Andrade 2017; Cho 2017; Danzl 2012; Fusco 2013a; Hamoudi 2018; Jo 2008a; Lee 2014; Mazzoleni 2019; Mortensen 2016; Nair 2011; Nicolo 2017; Park 2015; Picelli 2015; Rabadi 2017; Rocha 2016; Saeys 2015; Salazar 2019; Sattler 2015; Seo 2017; Shaheiwola 2018; Sik 2015; Straudi 2016; Tedesco Triccas 2015b; Utarapichat 2018; Viana 2014; Yi 2016; Yun 2015), whereas the remaining studies reported no dropouts, adverse events or deaths. When analysing 47 studies with 1330 participants, we found no evidence of effect regarding differences in dropouts, adverse effects and deaths between intervention and control groups (RR 1.25, 95% CI 0.74 to 2.13; Mantel-Haenszel method with random-effects model; analysis based only on studies that reported either on dropouts or on adverse events or on both; moderate-quality evidence; Analysis 1.10; Summary of findings 1). A detailed description of dropouts, adverse events and deaths during the intervention period can be found in Table 3.

By visual inspection, the authors concluded that there were no indications of funnel plot asymmetry that would suggest the presence of publication bias in Analysis 1.10 (Figure 11).

Figure 11. Funnel plot of comparison: 1 tDCS versus any type of placebo or passive control intervention, outcome: 1.10 Secondary outcome measure: dropouts, adverse events and deaths during the intervention period.



Comparison 2. tDCS versus any type of active control intervention

Comparison 2.1 Primary outcome measure: ADL at the end of the intervention period, absolute values

There were three studies with 121 participants that examined the effects of tDCS on ADL at the end of the intervention period and provided absolute values on this outcome (Bang 2015; Lee 2014; Qu 2009). There was evidence of effect of tDCS on ADL at the end of the intervention period (MD 6.59 BI points, 95% CI 1.26 to 11.91; inverse variance method with random-effects model; low-quality evidence; Analysis 2.1; Summary of findings 2). We did not identify any study examining the effects of tDCS versus any type of active control intervention on ADL at follow-up.

Comparison 2.2 Secondary outcome measure: upper extremity function at the end of the intervention period

2.2.1 Studies presenting absolute values

Five studies with a total of 124 participants which examined upper extremity function at the end of the intervention period and reported absolute values for this outcome (Cha 2014; Cho 2017; Hathaiareerug 2019; Lee 2014; Wong 2015). We found evidence of an effect regarding upper extremity function at the end of the intervention period (SMD 0.84, 95% CI 0.20 to 1.48; inverse variance method with random-effects model; low-quality evidence; Analysis 2.2; Summary of findings 2). We did not identify any study examining the effects of tDCS versus any type of active control intervention on upper extremity function at follow-up.

2.2.2 Studies presenting change scores

There was one study with 32 participants that examined the effects of tDCS on upper extremity function at the end of the intervention period and reported change values for this outcome (Hamoudi 2018). This study reported no evidence of effect of tDCS on upper extremity function at the end of the intervention period (SMD 0.51, 95% CI -0.20 to 1.22; inverse variance method with random-effects model; low-quality evidence; Analysis 2.2; Summary of findings 2). We could not identify any study examining the effects of tDCS versus any type of active control intervention on upper extremity function at follow-up.

Comparison 2.3 Secondary outcome measure: upper extremity function at the end of follow up

One study with 32 participants examined the effects of tDCS on upper extremity function at the end of the follow-up (Hamoudi 2018). This study reported no evidence of effect of tDCS on upper extremity function (MD 10.00% in change of the time to complete the JTT, 95% CI -0.07 to 20.07; inverse variance method with random-effects model; moderate-quality evidence; Analysis 2.3; Summary of findings 4).

Comparison 2.4 Secondary outcome measure: lower extremity function at the end of the intervention period

Three studies with a total of 66 participants which examined lower extremity function at the end of the intervention period (Cha 2014; Cho 2017; Park 2015). We found no evidence of an effect regarding lower extremity function at the end of the intervention period (SMD 0.23, 95% CI -0.66 to 1.13; inverse variance method with random-effects model; moderate-quality evidence; Analysis 2.4). We did not identify any study examining the effects of tDCS versus any type of active control intervention on lower extremity function at follow-up.

Comparison 2.5 Secondary outcome measure: muscle strength at the end of the intervention period

There were two studies with 57 participants that examined the effects of tDCS on muscle strength at the end of the intervention period (Hathaiareerug 2019; Lee 2014). These studies reported no evidence of effect of tDCS on muscle strength at the end of the intervention period (SMD 0.08, 95% CI -0.44 to 0.60; inverse variance method with random-effects model; low-quality evidence; Analysis 2.5). We could not identify any study examining the effects of tDCS versus any type of active control intervention on muscle strength at follow-up.

Comparison 2.6 Secondary outcome measure: spatial neglect at the end of the intervention period

There was one study with 12 participants that examined the effects of tDCS on upper extremity function at the end of the intervention period and reported change values for this outcome (Bang 2015). This study reported no evidence of effect of tDCS on lower extremity function at the end of the intervention period (MD -0.53 points in the line bisection test, 95% CI -0.93 to -0.13; moderate-quality evidence; Analysis 2.6). We could not identify any study examining the effects of tDCS versus any type of active control intervention spatial neglect at follow-up.

Comparison 2.7 Secondary outcome measure: dropouts, adverse events and deaths during the intervention period

Seven studies with 209 participants reported dropouts, adverse events, or deaths that occurred during the intervention period (Hamoudi 2018; Hathaiareerug 2019; Lee 2014). We found no evidence of effect regarding differences in dropouts, adverse effects and deaths between intervention and control groups (RR 1.76, 95% CI 0.43 to 7.17; Mantel-Haenszel method with random-effects model; analysis based only on studies which reported either on dropouts or on adverse events or on both; moderate-quality evidence; Analysis 2.7; Summary of findings 2).

Comparison 3. Subgroup analyses

Outcome 3.1. Planned analysis: duration of illness - acute/subacute versus postacute versus chronic phase for ADL at the end of the intervention period

In a planned subgroup analysis, we analysed the effects of tDCS on the primary outcome of ADL in the acute/subacute and postacute phases (Analysis 3.1). We found no evidence for different effects of tDCS between subgroups (P = 0.58).

Outcome 3.2. Planned analysis: effects of type of stimulation (A-tDCS/C-tDCS/dual-tDCS) and location of stimulation (lesioned/non-lesioned hemisphere) on ADL at the end of the intervention period

We performed a planned subgroup analysis regarding the location of electrode positioning and hence of stimulation (Analysis 3.2). No studies investigated the effects of A-tDCS over the non-lesioned hemisphere. We found no evidence of differences in effects of location and type of stimulation regarding ADL performance between subgroups (P = 0.34).

Outcome 3.3. Planned sensitivity analysis regarding types of control interventions (sham tDCS/conventional therapy/no intervention)

We performed a planned subgroup analysis regarding the type of control interventions (Analysis 3.3). We found no evidence of differences in effects of location and type of stimulation regarding ADL performance between subgroups (P = 0.53).

Sensitivity analyses

We conducted a sensitivity analysis of methodological quality to test the robustness of our results. We repeated the analysis of our primary outcome, ADL performance at the end of the intervention period and at the end of follow-up, and considered only studies with correctly concealed allocation, blinding of assessors and ITT. The evidence of an effect of tDCS disappeared when we analysed only those studies with correct allocation concealment. See Table 1 and Table 4.

DISCUSSION

Summary of main results

This review focused on evaluating the effectiveness of transcranial direct current stimulation (tDCS) (anodal stimulation (A-tDCS)/cathodal stimulation (C-tDCS)/(anodal plus cathodal stimulation simultaneously (dual-tDCS)) versus any passive control intervention (sham tDCS or no intervention) and tDCS versus any active control intervention (any other approach) for improving ADL, arm and leg function, muscle strength and cognitive abilities (including spatial neglect), dropouts and adverse events in people after stroke. We included 67 studies involving a total of 1729 participants.

Comparison 1: tDCS versus any type of placebo or passive control intervention

We found 19 studies with 686 participants examining the effects of tDCS on our primary outcome measure, ADL, after stroke. In addition to these studies presenting absolute values of the outcome, we found four studies with 95 participants, presenting change values for the outcome. We found moderate-quality

evidence of effect regarding ADL performance at the end of the intervention period for the studies presenting absolute values (SMD 0.28, 95% CI 0.13 to 0.44) and also moderate-quality evidence for the studies presenting change scores (SMD 0.48, 95% CI 0.02 to 0.95). The funnel plot shows no evidence of a small-study effect. Six studies with 269 participants reporting absolute values assessed the effects of tDCS on ADL at the end of follow-up and one study with 16 participants reported change scores. Moderate-quality evidence and low-quality evidence suggested an effect regarding ADL performance (SMD 0.31, 95% CI 0.01 to 0.62 and SMD -0.64, 95% CI -1.66 to 0.37, respectively). However, this effect was not sustained when including only studies with adequate allocation concealment (Table 1; Table 4). Also, one could argue that the effect is not clinically important when using SMD 0.5 as a surrogate threshold for clinical relevance, as suggested by the GRADE working group (Schünemann 2013).

One of our secondary outcome measures was upper extremity function. Thirty-four trials with a total of 985 participants measured upper extremity function at the end of the intervention period, revealing no evidence of an effect in favour of tDCS (SMD 0.17, 95% CI -0.05 to 0.38 for studies presenting absolute values; moderate-quality evidence, and SMD 0.33, 95% CI -0.12 to 0.79 for studies presenting change values; low-quality evidence). Regarding the effects of tDCS on upper extremity function at the end of follow-up, we identified five studies with a total of 211 participants (absolute values) and three studies with 72 participants (change scores) that showed no evidence of an effect (SMD -0.00, 95% CI -0.39 to 0.39; moderate-quality evidence and SMD 1.07, 95% CI 0.04 to 2.11; low-quality evidence, respectively). Twelve studies with 258 participants examined the effect of tDCS on lower extremity function, but did not show evidence of an effect (moderate-quality evidence). Eighteen studies with 551 participants reported outcome data for muscle strength at the end of the intervention period, but in the corresponding meta-analysis there was no evidence of an effect (high- and moderate-quality evidence, respectively). Three studies with 156 participants reported outcome data on muscle strength at follow-up, but there was no evidence of an effect (moderate-quality evidence).

Six studies with 116 participants examined the effects of tDCS on cognitive abilities (including spatial neglect). Two studies with 56 participants showed no evidence of an effect on cognitive abilities (SMD 0.46, 95% CI -0.10 to 1.02; low-quality evidence) and another three studies, which could not be included in meta-analysis reported evidence of an effect. One study with 30 participants showed evidence of effect on spatial neglect in meta-analysis (MD 4.80 points in the line-bisection test, 95% CI 0.13 to 9.47: very low-quality evidence) and we identified another randomised cross-over trial with 15 participants that examined the effects of tDCS on neglect (but could not be included in meta-analysis); this trial reported evidence of an effect of tDCS on neglect.

Forty-one of 60 studies (74%) reported data on dropouts, and 33 of 60 studies (55%) reported data on adverse events. In 25 of 60 studies (42%), dropouts, adverse events or deaths that during the intervention period occurred. We found no evidence of an effect regarding differences in dropouts, adverse effects and deaths between intervention and control groups (RR 1.25, 95% CI 0.74 to 2.13; Mantel-Haenszel method with random-effects model; analysis based only on studies that reported either on dropouts or on adverse events or on both; moderate-quality evidence).

A summary of this comparison's main findings can be found in Summary of findings 1 and Summary of findings 3.

Comparison 2: tDCS versus any type of active control intervention

We identified seven studies with 209 participants comparing active tDCS with an active control intervention (physiotherapy or virtual reality).

We found three studies with 121 participants examining the effects of tDCS on our primary outcome measure, ADL, after stroke. We found low-quality evidence of effect regarding ADL performance at the end of the intervention period (MD 6.59 BI points, 95% CI 1.26 to 11.91). There were no studies examining the effect of tDCS at follow-up.

One of our secondary outcome measures was upper extremity function: five trials with a total of 124 participants measured upper extremity function at the end of the intervention period, revealing evidence of an effect in favour of tDCS (SMD 0.84, 95% CI 0.2 to 1.48 for studies presenting absolute values; low-quality evidence, and SMD 0.51, 95% CI 0.2 to 1.22 for studies presenting change values; low-quality evidence). Regarding the effects of tDCS on upper extremity function at the end of follow-up, we identified one study with a total of 32 participants presenting change values that showed no evidence of an effect (MD 10% change in JTT-time, 95% CI -0.07 to 20.07; moderate-quality evidence). Three studies with 66 participants examined the effect of tDCS on lower extremity function, but did not show evidence of an effect (moderate-quality evidence). Two studies with 57 participants reported outcome data for muscle strength at the end of the intervention period, but in the corresponding meta-analysis there was no evidence of an effect (low-quality evidence). We could not identify any study examining the effects of tDCS on muscle strength at follow-up and no studies examining the effects of tDCS on cognitive abilities and spatial neglect. We identified one study with a total of 12 participants presenting change values that showed no evidence of an effect, but no meta-analysis was possible.

Seven of seven studies (100%) reported data on dropouts, and four of seven studies (57%) reported data on adverse events. In two of seven studies (29%), dropouts, adverse events or deaths occurred during the intervention period. We found no evidence of an effect regarding differences in dropouts, adverse effects and deaths between intervention and control groups (RR 1.76, 95% CI 0.43 to 7.17; Mantel-Haenszel method with random-effects model; analysis based only on studies that reported either on dropouts or on adverse events or on both; moderate-quality evidence).

A summary of this comparison's main findings can be found in Summary of findings 2 and Summary of findings 4.

Overall completeness and applicability of evidence

The results of this review appear to be generalisable to other settings in industrialised countries. However, some factors suggest uncertainty in generalisations. These include the following.

1. Most of the studies included participants with first-time stroke.
2. Most participants suffered from ischaemic stroke.

Hence, the results may be of limited applicability for people with recurrent and haemorrhagic strokes. Moreover, completeness of

evidence is lacking regarding studies on the effects of tDCS on lower limb function, cognitive abilities (including spatial neglect), and the reporting of adverse events.

The physiological mechanisms of tDCS are not yet fully understood (Buch 2017). Included studies are heterogeneous in terms of type, location and duration of stimulation, amount of direct current delivered, electrode size and positioning, and participants with cortical and subcortical stroke. For example, recent research suggests that the effectiveness of C-tDCS over the contralesional M1 depends on corticospinal tract integrity, thus implicating that this is not a 'one size fits all' intervention (Byblow 2011). Hence, it could be that this heterogeneity, even in the absence of excess heterogeneity in our analyses, produces a false-negative finding (Antal 2015). It also has been proposed to conduct pragmatic and large RCTs in order to better identify treatment responders (Grefkes 2016).

Forty-eight of 67 studies (74%) reported data on dropouts, and 36 of 67 studies (55%) reported data on adverse events. In our analyses of adverse events, we therefore decided to include only studies that reported either on dropouts, or on adverse events, or on both. However, it could be that the real risk of dropouts or adverse events is underestimated in our analysis, since the analysis could be prone to reporting bias.

Quality of the evidence

Based on our assessments of the evidence provided in Summary of findings 1, Summary of findings 2, Summary of findings 3 and Summary of findings 4, we downgraded evidence quality due to several included studies with high risk of bias and the imprecision of effect estimates that included the effect size of no difference in the comparators. We also found heterogeneity regarding trial design (parallel-group or cross-over design, two or three intervention groups), therapy variables (type of stimulation, location of stimulation, dosage of stimulation) and participant characteristics (age, time post-stroke, severity of stroke/initial functional impairment).

Potential biases in the review process

The methodological rigour of Cochrane Reviews minimises bias during the process of conducting systematic reviews. However, some aspects of this review represent an 'open door' to bias, such as eliminating obviously irrelevant publications according to titles and abstracts, based on the determination of only one review author (BE). This encompasses the possibility of unintentionally ruling out relevant publications. Another possibility is that publication bias could have affected our results. With the funnel plot for our main outcome of ADL (at the end of the intervention period) showing no asymmetry, a small-study effect or publication bias nevertheless could exist, resulting in overestimation of the effects (Figure 4) (Sterne 2011).

Another potential source for the introduction of bias is that two of the review authors (JM and MP) were involved in conducting and analysing the largest of the included trials (Hesse 2011). However, in our review, they did not participate in extracting outcome data and determining risk of bias for Hesse 2011. They were replaced by another review author (JK), so that the introduction of bias is unlikely in this case.

We had to exclude nine trials from quantitative synthesis (meta-analysis) because of missing information regarding treatment order (i.e. the first intervention period of the cross-over trial) (Au-Yeung 2014; Fregni 2005a; Jo 2008a; Kang 2008b; Kim 2009; Klomjai 2018; Ko 2008a; Mahmoudi 2011; Sohn 2013; Sunwoo 2013a). However, the results of these trials regarding upper and lower extremity function and spatial neglect but not on cognitive abilities are mostly consistent with the results of comparisons made in our meta-analyses, and it is therefore unlikely that the results of these studies would have substantially altered our results.

Agreements and disagreements with other studies or reviews

As far as we know, there are several systematic reviews on the effects of tDCS on function after stroke: Tedesco Triccas 2015a included true RCTs with multiple sessions of tDCS. They included nine studies with 371 participants and showed no evidence of effect at the end of the intervention period (SMD 0.11, 95% CI -0.17 to 0.38) or at long-term follow-up (SMD 0.23, 95% CI -0.17 to 0.62). These results are similar to the results of our analyses regarding the effects of tDCS (combined) on upper limb function.

Another systematic review of quasi-randomised and properly randomised controlled trials has examined the effects of A-tDCS on upper limb motor recovery in stroke patients (Butler 2013). The review authors included eight trials with 168 participants, and their analysis revealed evidence of an effect of tDCS on upper limb function (SMD 0.49, 95% CI 0.18 to 0.81), mainly measured by the JTT. This is different to our results, which may be explained by a different search strategy, different selection criteria and a different outcome measure.

In another systematic review on the effects of tDCS, Adeyemo 2012 included 50 non-randomised trials and RCTs with 1314 participants (1282 people with stroke and 32 healthy volunteers) on the pooled effects of tDCS and rTMS on motor outcomes after stroke. With their analysis based on change values, they revealed an effect of SMD 0.59, 95% CI 0.42 to 0.76). These results differ from the results of our analyses, perhaps because the review by Adeyemo 2012 included non-randomised studies, which tend to overestimate treatment effects (Higgins 2011a), and because of that review's statistical pooling of tDCS data with trials examining the effects of rTMS on motor outcomes after stroke.

Two other systematic reviews included meta-analyses dealing with the topic of tDCS for improving function after stroke (Bastani 2012; Jacobson 2012). Bastani 2012 examined the effects of A-tDCS on cortical excitability (as measured by transcranial magnetic stimulation (TMS)) and upper extremity function (mainly measured by JTT) in healthy volunteers and people with stroke. Their analysis of the effects of A-tDCS over the lesioned hemisphere, based mainly on results of randomised cross-over studies, yielded no evidence of effect (SMD 0.39, 95% CI -0.17 to 0.94). Jacobson 2012, a review about the effects of A-tDCS and C-tDCS on healthy volunteers, stated that the anodal-excitation and cathodal-inhibition (AeCi) dichotomy is relatively consistent regarding the effects of tDCS on function in healthy volunteers. However, we found no evidence of effect for A-tDCS over the lesioned hemisphere in our planned subgroup analysis, which is consistent with the findings of Bastani 2012, but not with the findings of Suzuki 2012. In contrast to that, we found evidence of an effect of tDCS on ADL for C-tDCS over the non-lesioned hemisphere, which in turn is consistent with the findings of Suzuki 2012. However, when compared with the subgroups, A-tDCS over the lesioned hemisphere and dual-tDCS, the subgroup C-

tDCS over the non-lesioned hemisphere has the highest statistical power.

O'Brien 2018 and colleagues performed a systematic review with meta-analysis of RCTs examining the effect of tDCS and rTMS on fine motor improvement after stroke and in healthy volunteers. There was evidence of an effect of tDCS (SMD 0.31, 95% CI 0.08 to 0.55, 18 studies), which is comparable to our findings. Another published systematic review with meta-analysis dealt with the effects of tDCS on walking ability after stroke (Li 2018). The authors included 10 RCTs with 194 participants and showed evidence of effect of tDCS on mobility (SMD 0.44, 95% CI 0.01 to 0.87) and muscle strength of the lower limb (SMD 1.54, 95% CI 0.29 to 2.78), but not on walking endurance (SMD 0.28, 95% CI -0.28 to 0.84) and balance function (SMD 0.44, 95% CI -0.06 to 0.94). In our analyses, there was no evidence of effect regarding lower limb function and muscle strength, which may be due to a different search strategy, different selection criteria and a different approach to statistical analysis. A published systematic review with meta-analysis on motor-learning after stroke showed that there is evidence of a longer-term retention effect of tDCS (SMD 0.59, 95% CI 0.40 to 0.79; mean retention interval 44 days) (Kang 2016). It also showed evidence of an effect of A-tDCS (SMD 0.59, 95% CI 0.20 to 0.97) and C-tDCS (SMD 0.60, 95% CI 0.15 to 1.04) as well as Dual tDCS (SMD 0.68, 95% CI 0.37 to 0.99), which is not consistent with our findings, since in our subgroup analysis there was only evidence of an effect of C-tDCS. This difference may be explained by a different search strategy and different selection criteria. Another published systematic review with meta-analysis about the use of tDCS in post-stroke upper extremity motor recovery found evidence of an effect of tDCS (SMD 0.61, 95% CI 0.08 to 1.13, eight studies with 213 participants), which principally is in accordance with our findings, although the effect size in our analyses was smaller (Chhatbar 2016). Furthermore, they found a relatively large effect size for tDCS in people with chronic stroke (SMD 1.23, 95% CI 0.20 to 2.25), which is not consistent with our findings. This discrepancy may be explained by a different search strategy and different selection criteria. Another systematic review found evidence of an effect of tDCS on motor-evoked potentials (MEP), but not on physiologic parameters, which is not in accordance with our findings (Horvath 2015). Most of the published systematic reviews to date have focused on the effects of tDCS on function and ADL. A systematic review with meta-analysis on the efficacy of non-invasive brain stimulation on spatial neglect after stroke concluded that there is evidence of effect of tDCS for improving neglect of the stroke (SMD 0.51, 95% CI 0.01 to 1.02), which is consistent with our findings (Fan 2018).

There is also a comprehensive published guideline on the therapeutic use of tDCS, which also covers the application in people with stroke In order to improve motor function (Lefaucheur 2017). The guideline states that there is insufficient evidence to either refute or recommend tDCS in routine clinical practice for improving motor function after stroke and hence gives no recommendation regarding its use.

Further research for optimising stimulation parameters is needed. Further directions in tDCS research should aim at identifying the patients who may benefit the most from tDCS by, for example high definition (HD)-tDCS to increase focality, tDCS during MRI to increase spatial resolution and tDCS with concomitant EEG to increase temporal resolution (Elsner 2018). Future research should adhere to the Stroke Recovery and Rehabilitation Roundtable's core recommendations regarding the development, monitoring and reporting of stroke rehabilitation research (Walker 2017).

To our knowledge, our review, including 67 true RCTs with a total of 1729 participants, is the most comprehensive review about the effects of tDCS on ADL, function, muscle strength and cognitive abilities (including spatial neglect) in stroke.

AUTHORS' CONCLUSIONS

Implications for practice

Currently, evidence of low- to moderate-quality suggests that transcranial direct current stimulation (tDCS) (anodal stimulation (A-tDCS)/cathodal stimulation (C-tDCS)/(anodal plus cathodal stimulation simultaneously (dual-tDCS)) versus control (sham tDCS or any other approach or no intervention) might improve activities of daily living (ADL) after stroke. However, the results did not persist in a sensitivity analyses that included only trials with proper allocation concealment. The evidence from our Cochrane Review does not support the use in clinical practice of tDCS to improve ADL. Evidence of low to high quality suggests that there is no effect of tDCS on arm function (except when comparing tDCS versus passive comparators and considering only studies presenting change scores at follow-up and comparing tDCS versus active comparators and considering only studies presenting absolute values; in these cases there is evidence of low quality favouring tDCS). There is low to high quality evidence that there is no effect in favour of tDCS on leg function, muscle strength and cognitive abilities in people after stroke. Evidence of very low quality suggests that there is an effect on hemispatial neglect. Evidence of moderate quality indicates that no effect regarding dropouts and adverse events can be seen between tDCS and control groups. However, this effect may be underestimated due to reporting bias.

Implications for research

Currently, the quality of evidence is of very low to high quality, but there are many ongoing randomised trials on this topic that could change the quality of evidence in the future. Future studies should, in particular, engage with patients who may benefit the most from tDCS after stroke, but should also investigate the effects of tDCS in routine application. Furthermore, dropouts and adverse events should be routinely monitored and presented as secondary outcomes. Methodological quality of future studies, particularly in relation to allocation concealment and intention-to-treat analysis, needs to be improved. Future studies should also adhere to the CONSORT statement's recommendations (Schulz 2010), particularly for reporting dropouts and adverse events. Information on treatment order in randomised cross-over trials also should be routinely presented in future publications.

ACKNOWLEDGEMENTS

We thank Brenda Thomas for assistance in developing the search strategy and Hazel Fraser for giving us helpful support. We thank Shunjie Chua, Dee Shneiderman, Christine Fyfe and Nji Mbaka Fon for their valuable contribution as Consumer Reviewers. We also thank all researchers, who answered our requests and provided additional information.

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Allman 2016

Study characteristics	
Methods	Study design: RCT
	Number of dropouts: 2 (in experimental group)
	Number of adverse events: not stated
	Deaths: none
	ITT: no

Allman 2016 *(Continued)*

Participants	Country: UK Sample size: 24 patients (11 in experimental and 13 in control group) Inclusion criteria: at least 6 months after a single unilateral ischaemic or haemorrhagic stroke affecting motor function in the contralesional hand, informed consent Exclusion criteria: previous stroke or stroke affecting the primary motor cortex, inability to provide informed consent due to severe language or cognitive impairment, and contraindications for tDCS
Interventions	2 arms: 1. anodal tDCS (1 mA over the lesioned M1) during the first 20 minutes of daily self-administered Graded Repetitive Arm Supplementary Program (GRASP) training for 60 minutes over 9 days 2. sham tDCS (1 mA over the lesioned M1) during the first 10 seconds of daily self-administered GRASP training for 60 minutes over 9 days
Outcomes	Outcomes were measured at baseline and at 10, 17, 30 and 90 days after study start: 1. WMFT 2. ARAT 3. UE-FM
Funding source	Supported by the Dunhill Medical Trust, Oxford NIHR (National Institute for Health Research) Biomedical Research Centre, Wellcome Trust, Medical Research Council, and The People Programme (Marie Curie Actions) of the European Union's Seventh Framework Programme FP7/2007-2013/ under Research Executive Agency (REA) grant agreement no. PITN-GA-2011-290011
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "A random number generator was used to assign conditions in blocks of four, stratified by starting level on the motor training program"
Allocation concealment (selection bias)	Unclear risk	Quote: "Randomization was performed by a researcher (H.J.-B.) who was not involved in any baseline assessments, and allocation was communicated to one other researcher (U.A.)."
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	Participants were blinded. Personnel performing the baseline treatment were blinded, whereas personnel performing tDCS was not. Quote: "Motor training was carried out by a researcher blind to stimulation conditions [...] tDCS was delivered by a researcher who was aware of the stimulation conditions"
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants were blinded. Personnel performing the baseline treatment were blinded, whereas personnel performing tDCS was not. Quote: "Motor training was carried out by a researcher blind to stimulation conditions [...] tDCS was delivered by a researcher who was aware of the stimulation conditions"
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "All clinical assessments were scored by a researcher blind to stimulation conditions"

Allman 2016 *(Continued)*

Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "All clinical assessments were scored by a researcher blind to stimulation conditions"
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	There were two dropouts in the tDCS group. The reason for this was not described by the authors. There was no intention-to-treat analysis. Quote: "Of 1191 patients assessed for eligibility, 26 were randomized to receive either anodal tDCS or sham treatment, and 24 completed the intervention"
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	There were two dropouts in the tDCS group. The reason for this was not described by the authors. There was no intention-to-treat analysis. Quote: "Of 1191 patients assessed for eligibility, 26 were randomized to receive either anodal tDCS or sham treatment, and 24 completed the intervention"
Selective reporting (reporting bias)	Unclear risk	There is a published protocol for this study (NCT01414582). All outcomes listed in the protocol have been reported, except the reaction time task and the SIS.

Andrade 2017

Study characteristics	
Methods	Study design: RCT Number of dropouts: none Number of adverse events: 16 out of 60 patients (27%) experienced mild adverse events Deaths: none ITT: yes
Participants	Country: Brazil Sample size: 60 (20 in 2 experimental groups and 20 in control group) Inclusion criteria: age between 18 and 65 years; diagnosis of unilateral, nonrecurring, subacute stroke, as defined by the International Classification of Diseases (ICD10) through CT or MRI conducted by neurologists, one to three months after vascular injury. Participants also had to be able, by using any method of pinch, to grasp a washcloth from a table top, lift it up a few inches, and release it. Exclusion criteria: actively extension of the wrist more than 10°, extend ≥ 2 digits more than 10° and abduct the thumb more than 10°, difficulties in understanding the instructions, cognitive deficits, tDCS contraindications
Interventions	3 arms: 1. A-tDCS (0.7 mA over M1, duration not described) on 5 consecutive days for 2 weeks prior to CIMT (3-hour daily protocol) 2. A-tDCS (0.7 mA over PMC, duration not described) on 5 consecutive days for 2 weeks prior to CIMT (3-hour daily protocol) 3. S-tDCS (0.7 mA over M1 for 30 seconds) on 5 consecutive days for 2 weeks prior to CIMT (3-hour daily protocol)
Outcomes	Outcomes were measured at baseline and at the end of intervention:

Andrade 2017 *(Continued)*

1. BI
2. UE-FM
3. MAS
4. BBT
5. MRC
6. adverse events questionnaire

Funding source	None reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "The method of randomization was a 1 : 1: 1 permuted block randomization generated by a web based randomization tool (https://www.random.org)."
Allocation concealment (selection bias)	Low risk	Quote: "This was employed by concealed allocation of sequentially numbered, opaque sealed envelopes, so that the person responsible for allocation had no contact with patients or with the work of others."
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Participants were blinded Personnel were not blinded
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants were blinded Personnel were not blinded
Blinding of outcome assessment (detection bias) Subjective outcome measures	Unclear risk	Not described by the study authors
Blinding of outcome assessment (detection bias) Objective outcome measures	Unclear risk	Not described by the study authors
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	In comparison with the published trial protocol, the following outcomes are not reported: motor activity log, Biodex Balance electronic platform, Postural

Andrade 2017 *(Continued)*

	Assessment Scale for Stroke (PASS), Falls Efficacy Study, Short Physical Performance Battery (SPPB), Wolf Motor Function Test (WMFT)

Ang 2012

Study characteristics	
Methods	Study design: RCT Number of dropouts: none Number of adverse events: none (Ang 2015 [pers comm]) Deaths: none ITT: yes
Participants	Country: Singapore Sample size: 19 participants; mean age (SD) 54 (10) years; mean UE-FM (SD) 34 (8) Inclusion criteria: not explicitly stated Exclusion criteria: history of seizures; major depression; implants that interfered with tDCS; being able to operate an EEG-based motor imagery brain-computer interface (MI-BCI); further therapy aiming at improving function in the affected upper limb
Interventions	2 arms: 1. dual-tDCS with the anode placed over M1 of the affected hemisphere and the cathode placed over M1 the unaffected hemisphere (1 mA for 20 minutes) followed by 8 minutes of evaluation and 60 minutes of therapy using EEG-based MI-BCI with robotic feedback with the MIT-Manus device 5 times a week for 2 weeks 2. sham tDCS with the anode placed over M1 of the affected hemisphere and the cathode placed over M1 the unaffected hemisphere (1 mA for 30 seconds) followed by 8 minutes of evaluation and 60 minutes of therapy using EEG-based MI-BCI with robotic feedback with the MIT-Manus device 5 times a week for 2 weeks
Outcomes	Outcomes were measured at baseline, at the end of intervention period at 2 weeks and at 2 week follow-up: 1. UE-FM 2. online MI-BCI performance 3. event-related desynchronisation laterality coefficient
Funding source	This work was supported by the Science and Engineering Research Council of A*STAR (Agency for Science, Technology and Research), and the National Medical Research Council, Singapore
Notes	

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	People were randomised by "A randomization stratification generated using a computer-generated random sequence" (Ang 2015 [pers comm])

Ang 2012 *(Continued)*

Allocation concealment (selection bias)	Unclear risk	Quote: "Interventions of the subjects were applied by an engineer and a research assistant respectively. For tDCS, the research assistant was the only person who knew the randomization sequence for the subjects allocation" (Ang 2015 [pers comm])
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants were blinded; personnel were not blinded (Ang 2015 [pers comm])
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "Yes, the outcome assessors for Fugl-Meyer were blinded to group allocation" (Ang 2015 [pers comm])
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	Not all of the secondary outcome measures listed in the published trial protocol have been reported, but will be presented in further publications (RMT of affected M1; grip strength; BBT; MRI parameters)

Au-Yeung 2014

Study characteristics	
Methods	Study design: randomised controlled cross-over trial Number of dropouts: none Number of adverse events: not described Deaths: none ITT: yes
Participants	Country: China Sample size: 10 participants; mean age (SD) 63 (6) years; mean UE-FM (SD) 58 (8)

Au-Yeung 2014 *(Continued)*

	Inclusion criteria: not explicitly stated; participants were recruited from a convenience sample from two patient self help groups for stroke; participants were < 80 years of age; had a single stroke more than a year prior to enrolment and had weakness in the affected upper limb and could perform a pincer grip with the index finger Exclusion criteria: not explicitly stated, but people excluded were either illiterate in Chinese, had a history of other neurologic disorders, metal in the head, musculoskeletal pathologies affecting movements in the upper limbs, had aphasia or < 18 points on the MMSE
Interventions	Each participant underwent all of the following conditions: 1. A-tDCS over M1 of the affected hemisphere (1 mA for 20 minutes) plus sham tDCS over M1 of the unaffected hemisphere (1 mA for 10 seconds) once 2. C-tDCS over M1 of the unaffected hemisphere (1 mA for 20 minutes) plus sham tDCS over M1 of the affected hemisphere (1 mA for 10 seconds) once 3. Sham tDCS over M1 of the unaffected hemisphere plus sham tDCS over M1 of the affected hemisphere (1 mA for 10 seconds) once
Outcomes	Outcomes were measured at baseline and at the end of intervention period Primary outcome measures: 1. Purdue Pegboard Test (hand dexterity) 2. Color-word Stroop Test (selective attention) Secondary outcome measures: 1. pinch grip strength (handheld digital dynamometer) 2. fatigue (NRS)
Funding source	None reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "The sequence was determined in advance for each subject by drawing lots from an envelope"
Allocation concealment (selection bias)	Unclear risk	Quote: "The sequence was determined in advance for each subject by drawing lots from an envelope"
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Participants were blinded, but personnel were not Quote: "It was the third investigator (C.Y.) who set the tDCS parameters for both channels and operated the machine behind the subject throughout the experimental procedure"
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants were blinded, but personnel were not Quote: "It was the third investigator (C.Y.) who set the tDCS parameters for both channels and operated the machine behind the subject throughout the experimental procedure"
Blinding of outcome assessment (detection bias)	Low risk	Outcome assessors were blinded

Au-Yeung 2014 *(Continued)*

Subjective outcome measures		Quote: "Two other investigators (J.W. and E.C.) who were blinded to the allocated tDCS conditions then assessed the baseline motor status of the subjects' paretic upper limb"
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Outcome assessors were blinded Quote: "Two other investigators (J.W. and E.C.) who were blinded to the allocated tDCS conditions then assessed the baseline motor status of the subjects' paretic upper limb"
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcomes reported in the methods section reported

Bang 2015

Study characteristics	
Methods	Study design: RCT Number of dropouts: none Number of adverse events: not stated Deaths: none ITT: yes
Participants	Country: Republic of Korea Sample size: 12 (6 in experimental and 6 in control group) Inclusion criteria: ≥ 15% deviation to the right from the centre in the line bisection test (LBT), informed consent Exclusion criteria: severe cognitive impairment, contraindications to tDCS, unstable medical condition
Interventions	2 arms: 1. dual tDCS (1 mA for 20 minutes) during a mirror-based feedback training 30 minutes a day, 5 times a week for 3 weeks 2. mirror-based feedback training 30 minutes a day, 5 times a week for 3 weeks
Outcomes	Outcomes were measured at baseline and at the end of intervention: 1. MVPT (motor-free perception test) 2. LBT (line bisection test) 3. MBI
Funding source	None reported

Bang 2015 *(Continued)*

Notes

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) Subjective outcome measures	High risk	Not described
Blinding of participants and personnel (performance bias) Objective outcome measures	High risk	Not described
Blinding of outcome assessment (detection bias) Subjective outcome measures	Unclear risk	Not described
Blinding of outcome assessment (detection bias) Objective outcome measures	Unclear risk	Not described
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcomes reported in the methods section reported

Boggio 2007a

Study characteristics

Methods	Study design: randomised sham-controlled cross-over trial Dropouts: none Adverse events: none

Boggio 2007a *(Continued)*

	Deaths: none ITT: yes Duration: 16 weeks
Participants	Country: Brazil Number of participants: 4 Age: (mean ± SD) 60.75 ± 13.15 years Gender: 0 female Type of stroke: not described, most likely ischaemic stroke Time poststroke: (mean ± SD) 34.5 ± 27.74 months Severity: mean muscle strength of the finger flexors (MRC) 3.8; mean ASS 0.5 Inclusion criteria: not clearly stated, but all participants had chronic, subcortical stroke, were right-handed and had their stroke at least 12 months before study enrolment Exclusion criteria: not stated
Interventions	Characteristics: 4 weekly sessions of A-tDCS (1 mA) over the hand area of M1 of the lesioned hemisphere, or C-tDCS (1 mA) over the hand area of M1 of the non-lesioned hemisphere or sham tDCS over the hand area of M1 of the lesioned hemisphere for 20 minutes with at least 2 weeks of rest between stimulation conditions
Outcomes	Outcomes used: duration of JTT in seconds Time point(s) of measurement: at baseline, after the first and after the fourth session of each treatment condition
Funding source	This work was supported by a grant within the Harvard Medical School Scholars in Clinical Science Program (NIH K30 HL04095-03) to F.F. and by K24 RR018875, RO1-NS 47754, RO1-NS 20068 to A.P.-L.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Procedure not described Quote: "The order of these conditions was counterbalanced and randomised across subjects"
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of participants and personnel (performance bias)	Low risk	Participants were blinded; blinding of personnel was not described

Boggio 2007a *(Continued)*

Objective outcome measures		
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "A blinded rater evaluated motor function using the Jebsen-Taylor Hand Function Test"
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcomes reported in the methods section reported

Bolognini 2011

Study characteristics	
Methods	Study design: randomised controlled multicentre trial Dropouts: 7 Adverse events: none Deaths: not stated ITT: no
Participants	Country: not stated Number of participants: 14 participants from the outpatient population of 3 neurological research units Age: (mean ± SD) 46.71 ± 14.08 years Gender: 9 women (64%) Type of stroke: 2 haemorrhagic (14%) Time poststroke: (mean ± SD) 35.21 ± 26.45 months Severity: moderate to severe hemiparesis, as indexed by UE-FM (mean score 26, range 8 to 50) Inclusion criteria: ischaemic or haemorrhagic first-ever stroke, stroke onset > 6 months before the study, functional inclusion criteria as defined by the EXCITE trial Exclusion criteria: pre stroke motor impairment affecting the upper limbs, moderate to severe major depression, previous CIMT and/or tDCS and contraindications regarding CIMT and/or tDCS

Bolognini 2011 *(Continued)*

Interventions	Number of arms: 2 1. 14-day CIMT with shaping techniques + A-tDCS (2 mA, 40 minutes) over the lesioned primary motor cortex (M1) 2. 14-day CIMT with shaping techniques + sham tDCS (40 minutes) over the lesioned primary motor cortex (M1)
Outcomes	Outcomes used: 1. motor assessments: duration of JTT in seconds, handgrip strength, MAL, UE-FM 2. visual analogue scales for anxiety and pain/discomfort, questionnaire for adverse effects 3. time point of measurement: day 1, day 5, day 10 (end of treatment) and at 2 and 4 weeks of follow-up
Funding source	This work was supported by the American Heart Association (0735535T) (FF), University of Milano-Bicocca (NB, GV), IRCCS Istituto Auxologico Italiano (NB, GV, LT), Regione Lombardia-Ricerca Finalizzata 2009 (LT, CC)
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated randomisation list (Bolognini 2013 [pers comm])
Allocation concealment (selection bias)	Unclear risk	The principal investigator, who took no part in data collection, nor in participants' evaluations, nor in treatment, knew the randomisation list and performed allocation (Bolognini 2013 [pers comm])
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Participants were blinded; blinding of personnel was not described
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants were blinded; blinding of personnel was not described
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "The assessment of motor functions and the administration of the functional scales and questionnaires were performed by a trained staff, blinded to group assignment"
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "The assessment of motor functions and the administration of the functional scales and questionnaires were performed by a trained staff, blinded to group assignment"
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	Dropouts due to frustration and tiredness during assessment Quote: "Five patients (2 in the active group and 3 in the sham group) did not complete the JHFT. Two patients (1 in the active group and 1 in the sham group) did not complete the HS task." These participants have been excluded from analysis and presentation of results"

Bolognini 2011 *(Continued)*

Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	Dropouts due to frustration and tiredness during assessment Quote: "Five patients (2 in the active group and 3 in the sham group) did not complete the JHFT. Two patients (1 in the active group and 1 in the sham group) did not complete the HS task." These participants have been excluded from analysis and presentation of results"
Selective reporting (reporting bias)	Unclear risk	All outcomes reported in the methods section reported

Cha 2014

Study characteristics	
Methods	Study design: RCT Number of dropouts: none Number of adverse events: not reported Deaths: none ITT: yes
Participants	Country: Republic of Korea Sample size: 20 (10 in experimental and 10 in control group) Inclusion criteria: hemiplegia due to stroke; gait disturbances Exclusion criteria: not stated
Interventions	2 arms: 1. A-tDCS 1 mA for 20 minutes over M1 of the lesioned hemisphere + functional training for 30 minutes daily, 5 days a week for 4 weeks 2. functional training for 30 minutes daily, 5 days a week for 4 weeks
Outcomes	Outcomes were measured at baseline and at the end of intervention period: 1. Berg Balance Scale 2. grip strength 3. Fugl-Meyer Assessment (Upper Extremity) 4. Fugl-Meyer Assessment (Lower Extremity) 5. Fugl-Meyer Assessment (Balance)
Funding source	None reported
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Quote: "The subjects were assigned to the treatment groups by having each of the subjects take out one card from a box containing two types of card representing both of the treatment groups"

Cha 2014 *(Continued)*

Allocation concealment (selection bias)	Unclear risk	Not described by the authors
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of participants and personnel (performance bias) Objective outcome measures	Unclear risk	Not described by the authors
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias) Objective outcome measures	Unclear risk	Not described by the authors
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	Not described by the authors
Selective reporting (reporting bias)	Unclear risk	All outcomes reported in the methods section reported

Chang 2015

Study characteristics	
Methods	Study design: RCT Number of dropouts: none Number of adverse events: not described Deaths: none ITT: yes
Participants	Country: Republic of Korea Sample size: 24 (12 in experimental and 12 in control group)

Chang 2015 *(Continued)*

	Inclusion criteria: age between 21 and 80 years, first unilateral ischaemic stroke in the cortical or subcortical area, stroke diagnosed within 7-30 days of a cerebral infarct onset, hemiparesis at the time of evaluation, walking without physical assistance Exclusion criteria: severe somatosensory, apraxia, or cognitive impairments, serious medical complications, such as pneumonia or cardiac problems, from onset to final evaluation; and lesions in the cerebellum or brain stem
Interventions	2 arms: 1. A-tDCS (2 mA for 10 minutes with the anode over the tibialis anterior area of precentral gyrus of affected hemisphere) for 5 times a week for 2 weeks 2. sham tDCS (2 mA for 15 seconds with the anode over the tibialis anterior area of precentral gyrus of affected hemisphere) for 5 times a week for 2 weeks
Outcomes	Outcomes were measured at baseline and at the end of intervention period: 1. LE-FM 2. MI-LE 3. FAC 4. BBS 5. timed measures of gait
Funding source	This research was supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) and funded by the Ministry of Education, Science and Technology (grant no. 2010-0004373)
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	Participants: were blinded by sham tDCS Personnel: Quote: "Also, the therapists who performed conventional therapy were blind to the group assignment."
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants: were blinded by sham tDCS Personnel: Quote: "Also, the therapists who performed conventional therapy were blind to the group assignment."
Blinding of outcome assessment (detection bias) Subjective outcome measures	High risk	No blinding for subjective outcome measures described
Blinding of outcome assessment (detection bias)	Low risk	Quote: "The experiments [sic] for assessing MEP were blind to patient information, such as the group assignment and the outcomes of any functional evaluations."

Chang 2015 *(Continued)*

Objective outcome measures		
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcomes reported in the methods section reported

Chelette 2014

Study characteristics	
Methods	Study design: RCT Number of dropouts: not described Number of adverse events: ot described Deaths: none ITT: yes
Participants	Country: USA Sample size: 26 (20 in three experimental groups and 6 in control group) Inclusion criteria: age above 18 years, > 1 year post-stroke, severe UE motor deficit after a single stroke (inability to extend the affected metacarpophalangeal joints at least 10° and the wrist 20°) Exclusion criteria: within 3 months of recruitment addition or change in the dosage of drugs known to exert detrimental effects on motor recovery, including alphaadrenergic antagonists or agonists, phenothiazines, phenytoin, benzodiazepines, muscarinic receptor antagonists, dopaminergic antagonists, or other neuroleptics; untreated depression; history of multiple strokes; history of head injury with loss of consciousness; history of severe psychiatric illness or alcohol or drug abuse; positive pregnancy test or being of childbearing age and not using appropriate contraception; presence of ferromagnetic material in the cranium except in the mouth, including metal fragments from occupational exposure, and surgical clips in or near the brain; cardiac or neural pacemakers or implanted medication pumps
Interventions	4 arms: 1. A-tDCS (1.4 mA for 20 minutes with the anode placed over ipsilesional M1) on each of 10 consecutive weekdays prior to 3 hours of intensive task-oriented arm training 2. C-tDCS (1.4 mA for 20 minutes with the cathode placed over ipsilesional M1) on each of 10 consecutive weekdays prior to 3 hours of intensive task-oriented arm training 3. dual tDCS (1.4 mA for 20 minutes with the anode placed over ipsilesional M1 and the cathode over contralesional M1) on each of 10 consecutive weekdays prior to 3 hours of intensive task-oriented arm training 4. sham tDCS (1.4 mA for 30 seconds with the anode placed over ipsilesional M1) on each of 10 consecutive weekdays prior to 3 hours of intensive task-oriented arm training

Chelette 2014 *(Continued)*

Outcomes	Outcomes were measured at baseline and at the end of intervention: 1. UE-FM 2. ARAT 3. SIS
Funding source	This work was funded in part by the Cardinal Hill Stroke and Spinal Cord Injury Endowment #0705129700 and the American Heart Association Grant #11CRP7220009
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Following baseline evaluation, we used an experimental design generator and randomizer program for simple random allocation of subjects into 4 groups"
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	Quote: "Subjects, evaluators, and therapists delivering motor training were blind to group assignment."
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Quote: "Subjects, evaluators, and therapists delivering motor training were blind to group assignment."
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "Subjects, evaluators, and therapists delivering motor training were blind to group assignment."
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "Subjects, evaluators, and therapists delivering motor training were blind to group assignment."
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcomes reported in the methods section reported

Cho 2017

Study characteristics	
Methods	Study design: RCT Number of dropouts: not reported Number of adverse events: no serious adverse events Deaths: none ITT: yes
Participants	Country: Republic of Korea Sample size: 30 (15 in experimental and 15 in control group) Inclusion criteria: within 4 weeks after onset of first-ever stroke, a total Fugl-Meyer Assessment (FMA) score under 84, ability to undergo sequential finger tasks at the times of participation Exclusion criteria: active underlying major neurological disease or major psychiatric disease, had a history of seizure, or had metallic implants in the brain
Interventions	2 arms: 1. C-tDCS (2mA for 20 minutes) over the contralesional M1 during rTMS over ipsilesional motor cortex area corresponding to the disabled hand daily for 2 weeks 2. rTMS over ipsilesional motor cortex area corresponding to the disabled hand daily for 2 weeks
Outcomes	Outcomes were measured at baseline, at the end of intervention and at 2 months follow-up: 1. UE-FM 2. LE-FM 3. FMA (UE-FM + LE-FM)
Funding source	This study was supported by the National Research Foundation grant funded by the Korean government (MSIP) (NRF-2014R1A2A1A01005128)
Notes	

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) Subjective outcome measures	High risk	Participants and personnel were not blinded
Blinding of participants and personnel (performance bias)	High risk	Participants and personnel were not blinded

Cho 2017 *(Continued)*

Objective outcome measures		
Blinding of outcome assessment (detection bias) Subjective outcome measures	High risk	Participants and personnel were not blinded
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Participants and personnel were not blinded
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcomes reported in the methods section reported

Cunningham 2015

Study characteristics	
Methods	Study design: RCT Number of dropouts: not reported Number of adverse events: not reported Deaths: none ITT: yes
Participants	Country: USA Sample size: 12 (6 in experimental and 6 in control group) Inclusion criteria: ≥ 6 months post first-ever ischaemic or haemorrhagic stroke, inadequate ability to use the paretic hand in daily life Exclusion criteria: contraindications of TMS and imaging
Interventions	2 arms: 1. A-tDCS (1 mA for 30 minutes) over affected PMC and SMA, identified by neuronavigation during CIMT for 30 minutes, 3 times per week for 5 weeks 2. sham tDCS (1 mA for 30 seconds) over affected PMC and SMA, identified by neuronavigation during CIMT for 30 minutes, 3 times per week for 5 weeks
Outcomes	Outcomes were measured at baseline and at the end of intervention period: 1. UE-FM

Cunningham 2015 *(Continued)*

2. 9HPT
3. MAL
4. MEP

Funding source	This work was supported by the National Institutes of Health (1K01HD069504) and American Heart Association (13BGIA17120055) to EBP as well as by the Clinical & Translational Science Collaborative (RPC2014-1067) to DAC. Conflicts of Interest: AM has the following conflicts of interest to disclose: ATI, Enspire and Cardionomics (distribution rights from intellectual property), Spinal Modulation and Functional Neurostimulation (consultant).
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Participants apparently were blinded, whereas personnel were not
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants apparently were blinded, whereas personnel were not
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Outcome assessors were blinded
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Outcome assessors were blinded
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Low risk	Outcome measures have been reported for the outcomes listed in the published trial protocol, although the protocol did not state certain outcome measures for the outcomes

D'Agata 2016

Study characteristics	
Methods	Study design: randomised sham controlled cross-over trial in a factorial design Number of dropouts: not clearly stated Number of adverse events: not clearly stated Deaths: not stated ITT: yes
Participants	Country: Italy Sample size: 34 (8 in experimental group tDCS+rTMS, 16 in experimental group rTMS+tDCS, and 10 in control group sham tDCS) Inclusion criteria: chronic ischaemic or haemorrhagic stroke (> 6 months), aged between 18 and 70 years Exclusion criteria: global cognitive impairment (MMSE<25), severe functional disability (BI < 45), severe psychiatric disorders, degenerative neurological disorders, epilepsy, and severe medical conditions, implanted drug infusion systems, spinal/brain stimulators, endovascular coils
Interventions	2 arms (1a and 1b were conducted in a cross-over design and arm 2 in a parallel design): 1a. rTMS+Dual tDCS group received 10 daily sessions of rTMS for 2 weeks and after a washout period (at least 6 months) 10 daily sessions of dual tDCS + mirror therapy for 2 weeks. 1b. dual tDCS + mirror therapy group received 10 daily sessions of dual tDCS + mirror therapy for 2 weeks and after a washout period (at least 6 months) they received 10 daily sessions of rTMS for 2 weeks 2. sham tDCS + mirror therapy group received 10 daily sessions of dual tDCS + mirror therapy for 2 weeks
Outcomes	Outcomes were measured at baseline and at the end of each intervention period prior to cross-over: 1. ARAT 2. MMSE 3. Auditory evoked potential 4. Forward and backward digit span 5. Attentional Matrices 6. Short Story Test 7. Copy of Figure 8. Visual Search and Cancellation Tasks 9. Nelson MCST 10.Hamilton Depression Rating Scale (HDRS)
Funding source	None reported
Notes	All analyses are based on the comparison of arm 1b and arm 2, since arm 1a did not contain the same base therapy

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**

D'Agata 2016 *(Continued)*

Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Participants and personnel were blinded Quote: "The trial was randomized double blind (Subject, Caregiver, Outcomes Assessor)"
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants and personnel were blinded Quote: "The trial was randomized double blind (Subject, Caregiver, Outcomes Assessor)"
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Participants and personnel were blinded Quote: "The trial was randomized double blind (Subject, Caregiver, Outcomes Assessor)"
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Participants and personnel were blinded Quote: "The trial was randomized double blind (Subject, Caregiver, Outcomes Assessor)"
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	There were 6 dropouts in the treatment groups, but it was not clear, whether they occurred during the first treatment period prior to crossing over or afterwards
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	There were 6 dropouts in the treatment groups, but it was not clear, whether they occurred during the first treatment period prior to crossing over or afterwards
Selective reporting (reporting bias)	Low risk	Outcome measures have been reported for the outcomes listed in the published trial protocol

Danzl 2012

Study characteristics	
Methods	Study design: RCT Number of dropouts: 2 during intervention phase (1 in the experimental and 1 in the control group) Number of adverse effects: none Deaths: none ITT: no
Participants	Country: USA

Danzl 2012 *(Continued)*

	Sample size: 10 (5 in experimental and 5 in control group) Inclusion criteria: impaired gait following a single stroke sustained at least 12 months prior to enrolment, confirmed by radiographs and medical history Exclusion criteria: history of seizure; ferromagnetic material in the cranium; cardiac, neural, or medication implants; severe spasticity and/or decubitus ulcer(s) interfering with robot-assisted walking training, severe cognitive deficit
Interventions	2 arms: 1. A-tDCS over M1 of the leg of the affected hemisphere (2 mA for 20 minutes) prior to robot assisted walking training 3 times per week for 4 times 2. sham tDCS over M1 of the leg of the affected hemisphere (2 mA for 75 seconds) prior to robot assisted walking training 3 times per week for 4 times
Outcomes	Outcomes were measured at baseline, at the end of intervention phase and at 1 month follow-up: 1. 10 MWT 2. TUG 3. FAC 4. BBS 5. SIS-16
Funding source	This publication was supported by the National Center for Research Resources and the National Center for Advancing Translational Sciences, National Institutes of Health, through Grant UL1RR033173
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "Subjects were paired based on similar baseline ambulatory characteristics at eligibility screening and then randomly allocated to either the active anodal tDCS group or the control group (sham tDCS)."
Allocation concealment (selection bias)	Unclear risk	Quote: "Subjects were paired based on similar baseline ambulatory characteristics at eligibility screening and then randomly allocated to either the active anodal tDCS group or the control group (sham tDCS)."
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	Quote: "Subjects, the 2 physical therapists who administered LT-RGO, and the outcomes assessors were blinded to the tDCS condition."
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Quote: "Subjects, the 2 physical therapists who administered LT-RGO, and the outcomes assessors were blinded to the tDCS condition."
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "Subjects, the 2 physical therapists who administered LT-RGO, and the outcomes assessors were blinded to the tDCS condition."

Danzl 2012 *(Continued)*

Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "Subjects, the 2 physical therapists who administered LT-RGO, and the outcomes assessors were blinded to the tDCS condition."
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	2 patients (20%) dropped out during the intervention phase (1 in the tDCS and 1 in the sham group) due to reasons unrelated to the intervention
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	2 patients (20%) dropped out during the intervention phase (1 in the tDCS and 1 in the sham group) due to reasons unrelated to the intervention
Selective reporting (reporting bias)	Unclear risk	No published trial protocol found. All outcome measures listed in the methods section have been reported

Di Lazzaro 2014a

Study characteristics	
Methods	Study design: RCT Number of dropouts: none Number of adverse events: not reported Deaths: none ITT: yes
Participants	Country: Italy Sample size: 14 (7 in the experimental and 7 in the control group) Inclusion criteria: first ischaemic cerebral infarction confirmed by MRI; admitted to Stroke Unit; aged between 18 to 90 years; acute phase of stroke Exclusion criteria: pre-stroke disability; not understanding instructions for motor testing; excessive pain in any joint of the paretic limbs; contraindications to single-pulse TMS; advanced diseases of inner organs; concurrent neurologic or psychiatric diseases; history of substance abuse; use of neuropsychotropic drugs
Interventions	2 arms: 1. bilateral tDCS (anode over M1 of the lesioned hemisphere and cathode over M1 of the non-lesioned hemisphere, simultaneously) (2 mA for 40 minutes) for 5 continuous days 2. sham tDCS (anode over M1 of the lesioned hemisphere and cathode over M1 of the non-lesioned hemisphere, simultaneously) (2 mA for 30 seconds) for 5 continuous days
Outcomes	Outcomes were measured at baseline and at the end of intervention period: 1. Action Research Arm Test 2. 9 Hole Peg Test 3. handgrip strength 4. Motor Activity Log Scale 5. National Institute of Health Stroke Scale

Di Lazzaro 2014a *(Continued)*

	6. modified Rankin Scale 7. adverse event monitoring and reporting
Funding source	None reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "patients were randomized to real or sham tDCS treatment through a block randomization stratification approach"
Allocation concealment (selection bias)	Unclear risk	Not described by the study authors
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	Participants and personnel were blinded Quote "The investigators who applied real/sham tDCS were kept blind to the intervention by using the pre-programmed stimulation mode in the stimulator settings"
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants and personnel were blinded Quote "The investigators who applied real/sham tDCS were kept blind to the intervention by using the pre-programmed stimulation mode in the stimulator settings"
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "An evaluator, blinded to the treatment, assessed the effects of the intervention"
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "An evaluator, blinded to the treatment, assessed the effects of the intervention."
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	High risk	All outcomes listed in the methods section reported except 'Adverse events', which was not reported clearly

Di Lazzaro 2014b

Study characteristics

Di Lazzaro 2014b *(Continued)*

Methods	Study design: RCT Number of dropouts: none Number of adverse events: not reported Deaths: none ITT: yes
Participants	Country: Italy Sample size: 20 (10 in the experimental and 10 in the control group) Inclusion criteria: first ischaemic cerebral infarction confirmed by MRI; admitted to Stroke Unit; aged between 18 to 90 years; acute phase of stroke Exclusion criteria: pre-stroke disability; not understanding instructions for motor testing; excessive pain in any joint of the paretic limbs; contraindications to single-pulse TMS; advanced diseases of inner organs; concurrent neurologic or psychiatric diseases; history of substance abuse; use of neuropsychotrophic drugs
Interventions	2 arms: 1. bilateral tDCS (anode over M1 of the lesioned hemisphere and cathode over M1 of the non-lesioned hemisphere, simultaneously) (2 mA for 40 minutes) for 5 continuous days + constraint-induced movement therapy (at least 90 % of waking hours) for 5 days 2. sham tDCS (anode over M1 of the lesioned hemisphere and cathode over M1 of the non-lesioned hemisphere, simultaneously) (2 mA for 30 seconds) for 5 continuous days + constraint-induced movement therapy (at least 90 % of waking hours) for 5 days
Outcomes	Outcomes were measured at baseline, at the end of intervention period and at 3-month follow-up: 1. Action Research Arm Test 2. 9 Hole Peg Test 3. handgrip strength 4. Motor Activity Log Scale 5. National Institute of Health Stroke Scale 6. Modified Rankin Scale 7. adverse event monitoring and reporting 8. motor cortex excitability of both hemispheres 9. propensity of the motor cortex of the lesioned hemisphere to undergo LTP-like phenomena promoted by using intermittent theta burst stimulation (iTBS)
Funding source	None reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "patients were randomized to real or sham tDCS treatment through a block randomization stratification approach"
Allocation concealment (selection bias)	Unclear risk	Not described by the study authors

Di Lazzaro 2014b *(Continued)*

Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	Participants and personnel were blinded Quote "The investigators who applied real/sham tDCS were kept blind to the intervention by using the pre-programmed stimulation mode in the stimulator settings"
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants and personnel were blinded Quote "The investigators who applied real/sham tDCS were kept blind to the intervention by using the pre-programmed stimulation mode in the stimulator settings"
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "An evaluator, blinded to the treatment, assessed the effects of the intervention"
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "An evaluator, blinded to the treatment, assessed the effects of the intervention"
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	High risk	All outcomes listed in the methods section reported except 'Adverse events', which was not reported clearly

Fregni 2005a

Study characteristics	
Methods	Study design: randomised double-blind sham-controlled cross-over trial Dropouts: none Adverse events: none Deaths: none ITT: yes
Participants	Country: not clearly stated Number of participants: 6 participants with chronic stroke neuroimaging-proofed diagnosis; all were right-handed and all had their strokes at least 12 months before the study Age: (mean ± SD) 53.7 ± 16.6 years Gender: 4 women (66%)

Fregni 2005a *(Continued)*

	Type of stroke: not stated Time poststroke: 27.1 months (range 12 to 72 months) Severity: motor strength (mean ± SD) 4.18 ± 0.37; ASS (mean ± SD) 0.83 ± 0.75 Inclusion criteria: not clearly stated Exclusion criteria: not clearly stated, but the authors referred to Hummel 2005, where the exclusion criteria were as follows: severe depression, history of severe alcohol or drug abuse, severe language disturbances, particularly of a receptive nature, or serious cognitive deficits (MMSE < 23/30 points)
Interventions	Characteristics: each participant underwent 3 different conditions for 20 minutes, separated by at least 48 hours of rest: 1. A-tDCS of the lesioned hemisphere's M1 (1 mA). 2. C-tDCS of the non-lesioned hemisphere's M1 (1 mA). 3. sham tDCS (electrode montage not stated by the authors).
Outcomes	Outcomes used: duration of JTT in seconds Time point of measurement: at baseline after familiarisation session, during stimulation and directly after stimulation
Funding source	This work was supported by a grant within the Harvard Medical School Scholars in Clinical Science Program (NIHK30 HL04095-03) to F.F. and by K24 RR018875, RO1-NS 47754, RO1-NS 20068 to A.P.-L.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants were blinded; blinding of personnel was not described
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias)	Low risk	Outcome assessor was blinded Quote: "A blinded neuropsychologist—instructed not to communicate with the patient during the task—evaluated patients' performance"

Fregni 2005a *(Continued)*

Objective outcome measures		
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcomes reported in the methods section reported

Fusco 2013a

Study characteristics	
Methods	Study design: double-blinded, sham-controlled, randomised cross-over study Dropouts: none Adverse events: none Deaths: none ITT: yes
Participants	Country: Italy Number of participants: 9 Age (mean ± SD): 53.5 ± 20.7 years Gender: 4 (57%) women Type of stroke: 8 (89%) ischaemic, 1 (11%) haemorrhagic Time post-stroke (mean ± SD): 28.3 ± 10.4 days Severity (mean ± SD): grip strength 17.83 ± 7.45 kg Inclusion criteria: cortical or subcortical first-ever stroke (radiologically confirmed), possibility to perform pinch/grip test Exclusion criteria: history of chronic disabling pathologies of the upper limb; spasticity; presence of pacemaker or severe cardiovascular conditions; a history of tumour, prior neurosurgical brain intervention, severe cardiovascular conditions (including the presence of a pacemaker), a diagnosis of epilepsy or major psychiatric disorders
Interventions	Each participant underwent 1 of the following different stimulation conditions in 2 consecutive sessions on 2 consecutive days in random order (sham tDCS was obligatory) 1. A-tDCS for 15 minutes at 1.5 mA over M1 of the lesioned hemisphere 2. C-tDCS for 15 minutes at 1.5 mA over M1 of the non-lesioned hemisphere 3. dual-tDCS for 15 minutes at 1.5 mA, with the anode over M1 of the lesioned hemisphere and the cathode over M1 of the non-lesioned hemisphere

Fusco 2013a *(Continued)*

	4. sham tDCS (dosage and application not clearly stated, probably as in the other groups)
Outcomes	Outcomes were measured at baseline and at the end of intervention period: 1. Nine-Hole Peg Test-index (quote: "9HPT-index=velocity LS/velocity HS*100") 2. maximum pinch and grasp force in kg (measured by specific dynamometers according to the Jamar method, with a higher value indicating greater pinch and grasp force) 3. patient satisfaction as measured by the Quebec User Evaluation of Satisfaction with Assistive Technology
Funding source	None reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "For the random sequence generation, we used the RAND function in Matlab"
Allocation concealment (selection bias)	Low risk	Quote: "Specifically, patients were asked to take a sealed envelope from a box, containing a piece of paper with the assignment, which was concealed until the envelope was opened"
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Quote: "Patients were blinded while physicians and assessors knew the treatment (real or sham)"
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Quote: "Patients were blinded while physicians and assessors knew the treatment (real or sham)"
Blinding of outcome assessment (detection bias) Subjective outcome measures	High risk	Quote: "Patients were blinded while physicians and assessors knew the treatment (real or sham)"
Blinding of outcome assessment (detection bias) Objective outcome measures	Unclear risk	Quote: "Patients were blinded while physicians and assessors knew the treatment (real or sham)"
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated

Fusco 2013a *(Continued)*

Selective reporting (reporting bias)	Unclear risk	All outcomes reported in the methods section reported

Fusco 2014

Study characteristics	
Methods	Method: RCT Number of dropouts: 3 (2 (14%) in the experimental group, 1 (7%) in the control group) Number of adverse events: not reported Deaths: not described ITT: no
Participants	Country: Italy Sample size: 11 participants (5 in the experimental and 6 in the control group) Inclusion criteria: admission to stroke unit; age between 18 and 83 years; ischaemic stroke in the MCA area confirmed by MRI or CT; time since stroke less than 30 days; no history of severe cognitive impairment; written informed consent Exclusion criteria: inability to perform a motor rehabilitation training; haemorrhagic stroke or multiple foci of ischaemia; previous stroke; diagnosis of major psychiatric disorders; epilepsy; history of tumour; pacemaker; uncontrolled arrhythmias; non-stabilised heart diseases; dementia or severe aphasia
Interventions	2 arms 1. C-tDCS (1.5 mA for 10 minutes) over M1 of the unaffected hemisphere on 5 consecutive days each week for 2 weeks prior to a rehabilitative session 2. sham tDCS (not described) over M1 of the unaffected hemisphere on 5 consecutive days each week for 2 weeks prior to a rehabilitative session
Outcomes	Outcomes were measured at baseline, after the end of intervention period, 1 month after the intervention period and at the end of inpatient rehabilitation (75 to 110 days): 1. Canadian Neurological Scale 2. Barthel Index 3. 9-hole peg test 4. grasp and pinch force 5. Upper extremity Fugl-Meyer Assessment 6. Timed Up and Go Test 7. 6-Minute Walking Test 8. 10-Meter Walking Test 9. Rivermead Mobility Index 10. Functional Ambulation Categories
Funding source	None reported
Notes	
Risk of bias	

Fusco 2014 *(Continued)*

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "The randomization was created in accordance with a binary sequence previously generated using MATLAB R2007b Software (TheMatworks Inc., USA)"
Allocation concealment (selection bias)	Unclear risk	Not described by the study authors
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Quote: "The patient was blind to the type of stimulation. An unblinded investigator administered the stimulation"
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Quote: "The patient was blind to the type of stimulation. An unblinded investigator administered the stimulation"
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "The patient was blind to the type of stimulation, as well as the physician performing the assessments"
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "The patient was blind to the type of stimulation, as well as the physician performing the assessments"
Incomplete outcome data (attrition bias) Subjective outcome measures	High risk	Quote: "Two patients of EG dropped out from the study (one at the first and the other one at the second session). Also one patient of control group dropped out for an emergency transfer to another hospital." These participants have not been analysed
Incomplete outcome data (attrition bias) Objective outcome measures	High risk	Quote: "Two patients of EG dropped out from the study (one at the first and the other one at the second session). Also one patient of control group dropped out for an emergency transfer to another hospital." These participants have not been analysed
Selective reporting (reporting bias)	Unclear risk	All outcomes reported in the methods section reported

Geroin 2011

Study characteristics	
Methods	Study design: pilot RCT Dropouts: none Adverse effects: none Deaths: none ITT: yes

Geroin 2011 *(Continued)*

Participants	Country: Italy Number of participants: 30 outpatients Age: (mean ± SD) 62.7 ± 6.4 years Gender: 7 women (23%) Type of stroke: unilateral ischaemic stroke Time post-stroke: (mean ± SD) 26.4 ± 5.5 months Severity: mean ESS score 79.93 (minimum score: 0, maximum score: 100; a completely healthy person would have a score of 100) Inclusion criteria: at least 12 months from first unilateral ischaemic stroke, age < 75 years, ESS score ≥ 75 and ≤ 85, MMSE-score ≥ 24, ability to maintain standing position without aid for at least 5 minutes, ability to walk independently for at least 15 minutes with the use of walking aids Exclusion criteria: history of seizures, EEG suspect of elevated cortical excitability, metallic implants within the brain and previous brain neurosurgery, medications altering cortical excitability or with a presumed effect of brain plasticity, posterior circulation stroke, deficits of somatic sensations involving the paretic lower limb, presence of vestibular disorders/paroxysmal vertigo, severe cognitive or communicative disorders, cardiovascular comorbidity, rehabilitation treatment 3 months before study enrolment
Interventions	Number of arms: 3; all participants underwent 50-minute training sessions 5 times a week for 2 consecutive weeks and 1 of the following interventions: 1. robot-assisted gait training + A-tDCS of the lesioned hemisphere over the presumed leg area (1.5 mA for 7 minutes) 2. robot-assisted gait training + sham tDCS of the lesioned hemisphere over the presumed leg area (for 7 minutes) 3. overground walking exercises according to the Bobath approach
Outcomes	Primary outcomes: 6-Minute Walking Test, 10-Metre Walking Test Secondary outcomes: GAITRite system, FAC, RMI, MI leg subscore and MAS Time point of measurement: at baseline, after treatment and at two weeks follow-up
Funding source	This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "After baseline evaluation, patients were allocated to one of three treatment groups according to a simple software-generated randomisation scheme"
Allocation concealment (selection bias)	Low risk	Quote: "We allocated patients to one of the three treatment arms according to a restricted randomisation scheme. One of the investigators checked correct patient allocation according to the randomisation list. After unmasking at the end of the study, we checked that no errors had been made in allocation" (S-mania 2013 [pers comm])

Geroin 2011 *(Continued)*

Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Quote: "Asking the assessor to make an educated guess tested the success of blinding. The therapists were aware of the type of treatment received by the patients. Patients were aware of the type of treatment who underwent but they were not aware about the type of stimulation (Group 1 stimulation vs Group 2 sham stimulation)" (Smania 2013 [pers comm])
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Quote: "Asking the assessor to make an educated guess tested the success of blinding. The therapists were aware of the type of treatment received by the patients. Patients were aware of the type of treatment who underwent but they were not aware about the type of stimulation (Group 1 stimulation vs Group 2 sham stimulation)" (Smania 2013 [pers comm])
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "All patients were evaluated by the same examiner (an experienced internal coworker) who was not aware of the treatment received by the patients"
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "All patients were evaluated by the same examiner (an experienced internal coworker) who was not aware of the treatment received by the patients"
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcomes stated in the methods section were reported, except muscle tone as measured by MAS

Hamoudi 2018

Study characteristics	
Methods	Study design: RCT Number of dropouts: 5 (1 in sham tDCS group and 4 in no-training/no-tDCS group) Number of adverse events: 8 (6 in sham tDCS group and 2 in A-tDCS group) Deaths: none ITT: no
Participants	Country: Germany Sample size: 56 (19 in A-tDCS group, 19 in sham tDCS group and 18 in passive control group) Inclusion criteria: age 18 to 80 years, unilateral, first ever ischemic stroke ≥ 3 months before study enrolment, mild to moderate hemiparesis with residual hand function sufficient for task performance, clear hand preference as assessed by the Edinburgh Handedness Inventory and sufficient cognitive function to comply with study requirements

Hamoudi 2018 *(Continued)*

	Exclusion criteria: not stated
Interventions	3 arms: 1. A-tDCS (1.2 mA for 20 min) over the ipsilesional M1 during computerised grip strength training for 45 min per day for 5 days 2. sham tDCS (1.2 mA for 30 sec) over the ipsilesional M1 during computerised grip strength training for 45 min per day for 5 days 3. passive control group (did not receive training or tDCS)
Outcomes	Outcomes were measured at baseline, at day 8, 29, 57, 85 and 113 after study start: 1. overall training effect (time and group differences in skill) 2. total learning (the sum of skill changes at the end of training) 3. learning stages (online vs. offline learning) 4. generalization (JTT overall time) 5. online learning on the first day 6. cumulative learning probability 7. relation Between Online and Offline Learning 8. changes in movement time, target error rate, and movement smoothness 9. correlation of total learning with patient characteristics
Funding source	HMS was supported by a National Institutes of Health NINDS Intramural Competitive Postdoctoral Fellowship and K23NS078052; financial support for the work at the Freiburg site is provided by the German Research Foundation (MH, AS-M, BF, JR; DFG grant number RE 2740/3-1). LGC was supported by the Intramural Research Program of the National Institutes of Health, NINDS
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Allocation to a tDCS condition followed a balanced randomization list prepared prior to the experiment."
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	Participants were blinded in both study centres and personnel was blinded at the Freiburg site, whereas it was not at the NIH site. 80% of participants felt stimulated by active tDCS in the sham tDCS group and 70% in the A-tDCS group
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants were blinded in both study centres and personnel was blinded at the Freiburg site, whereas it was not at the NIH site. 80% of participants felt stimulated by active tDCS in the sham tDCS group and 70% in the A-tDCS group
Blinding of outcome assessment (detection bias) Subjective outcome measures	High risk	Blinding of outcome assessors not described
Blinding of outcome assessment (detection bias)	Low risk	Blinding of outcome assessors not described

Hamoudi 2018 *(Continued)*

Objective outcome measures		
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	5 participants dropped out during follow-up due to reasons unrelated with the intervention (1 in sham tDCS group due to finger infection and 4 in no-training/no-tDCS group due to medical interventions which altered task performance)
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	5 participants dropped out during follow-up due to reasons unrelated with the intervention (1 in sham tDCS group due to finger infection and 4 in no-training/no-tDCS group due to medical interventions which altered task performance)
Selective reporting (reporting bias)	Unclear risk	There is an a priori published trial protocol, which, however did not state certain outcome measures

Hathaiareerug 2019

Study characteristics	
Methods	Study design: RCT Number of dropouts: 1 (in the tDCS group until follow-up) Number of adverse effects: not reported Deaths: unclear ITT: yes
Participants	Country: Thailand Sample size: 18 (9 in experimental and 9 in control group) Inclusion criteria: haemorrhagic or ischaemic stroke more than 1 month prior validated by cerebral imaging, age between 20 to 80 years, presence of moderate to severe UE functional impairment (UE-FM score 0 to 47), being able to speak Thai Exclusion criteria: unstable medical condition, upper limb contracture, tDCS contraindication, or electro-acupuncture, epilepsy, malignant cardiac arrhythmia, pregnancy, traumatic conditions of the affected hand or peripheral nerve injury, presence of cognitive impairment as evaluated with the Thai MMSE with a score of less than 24, or psychiatric disorder and being unable to perform the given task or understand instructions
Interventions	2 arms: 1. dual tDCS (2 mA for 20 minutes) once a week for 3 weeks during intensive physical therapy and occupational therapy performed in hourly sessions 3 times per week for 3 weeks 2. electro-acupuncture once a week for 3 weeks during intensive physical therapy and occupational therapy performed in hourly sessions 3 times per week for 3 weeks
Outcomes	Outcomes were measured at baseline, at the end of intervention period and at 1 month follow-up: 1. UE-FM 2. PPT 3. grip strength (handheld dynamometer)
Funding source	None reported

Hathaiareerug 2019 *(Continued)*

Notes

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Participants were allocated to either TDCS or EA groups by sealed envelope with computer-generated blocks of four randomizations."
Allocation concealment (selection bias)	Low risk	Quote: "Participants were allocated to either TDCS or EA groups by sealed envelope with computer-generated blocks of four randomizations."
Blinding of participants and personnel (performance bias) Subjective outcome measures	High risk	Participants and personnel apparently were not blinded
Blinding of participants and personnel (performance bias) Objective outcome measures	High risk	Participants and personnel apparently were not blinded
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "The assessments were achieved by a physician who was blinded to group allocation."
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "The assessments were achieved by a physician who was blinded to group allocation."
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	There was 1 dropout (11%) in the dual tDCS group (reason was not provided)
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	There was 1 dropout (11%) in the dual tDCS group (reason was not provided)
Selective reporting (reporting bias)	Unclear risk	There is an a priori published protocol available on the Internet. The secondary outcome "Modified Ashworth Scale" was not reported in the publication

Hesse 2011

Study characteristics

Methods	Study design: double-blind randomised sham-controlled multicentre trial Dropouts: 11 (11%) Adverse effects: none

Hesse 2011 *(Continued)*

	Deaths: 2 (2%) due to heart infarction and during stent surgery ITT: yes, 85 participants completed the study (89%)
Participants	Country: Germany/Italy Number of participants: 96 stroke participants from 3 study centres Mean age: 65.0, range 39 to 79 years Gender: 37 women (39%) Type of stroke: all ischaemic, 45 of 96 (47%) right-hemispheric stroke Time poststroke: (mean ± SD) A-tDCS group: 3.4 ± 1.8 weeks; C-tDCS group: 3.8 ± 1.4 weeks; sham tDCS group: 3.8 ± 1.5 weeks Severity: at least wheelchair-mobile participants, who had severe flaccid upper limb paresis with no (MRC 0) or minimal (MRC 1) volitional hand and finger extensor activity. 24 had an upper limb UE-FM (range 0 to 66) < 18 and were unable to transfer 3 wooden blocks from 1 compartment to the other in the Box and Block test Inclusion criteria: age 18 to 79 years, first supratentorial ischaemic stroke with a stroke interval of 3 to 8 weeks' duration, and with participation in a comprehensive inpatient rehabilitation programme Exclusion criteria: history of epileptic seizures, EEG suspect of elevated cortical excitability, metallic implants in the brain, preceding brain surgery, sensitive scalp skin, anticonvulsant or neuroleptic medications
Interventions	Number of arms: 3; each participant practised for 6 weeks every working day for 20 minutes with the arm robot (AT) and simultaneously received one of the following interventions: 1. (1) A-tDCS (2 mA) with the anode positioned over the presumed hand area of the lesioned hemisphere 2. (2) C-tDCS (2 mA) with the cathode positioned over the presumed hand area of the non-lesioned hemisphere 3. sham tDCS (0 mA) with consecutive changing of the positions of arms (1) and (2)
Outcomes	Primary outcome: sensory and motor integrity, degree of synergy as assessed by UE-FM assessment score (0 to 66, 0 = no movement, 66 = full motion) Secondary outcomes: upper limb muscle strength (MRC; 0 to 5, 0 = plegic, 5 = full power), muscle tone (MAS; 0 to 5, 0 = no increase, 5 = affected part rigid in flexion or extension), BI, upper limb function (as assessed by Box and Block test, the transfer of as many wooden blocks as possible with the affected hand from 1 compartment to the other within 1 minute, with a high value indicating good function) Time point of measurement: study onset, end of the 6-week intervention and 3 months of follow-up
Funding source	The Verein zur Förderung der Hirnforschung und Rehabilitation e.V. supported the TRAGAT study (NCT 00407667)
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Following a telephone call, an independent person randomly allocated eligible patients to 1 of the 3 groups by drawing a lot out of an envelope containing 96 lots, indicating A, B, and C"
Allocation concealment (selection bias)	Low risk	Quote: "Following a telephone call, an independent person randomly allocated eligible patients to 1 of the 3 groups by drawing a lot out of an envelope

Hesse 2011 *(Continued)*

		containing 96 lots, indicating A, B, and C. He then informed the locally responsible person about the group assignment and the study started the next day"
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	Participants and personnel were blinded
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants and personnel were blinded
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "To ensure blinded evaluation of the FMS, videos of the assessment, where the patients sat on a chair and a mirror was placed 45° behind them, were sent to an experienced therapist off site" and "Two experienced physiotherapists, blinded with respect to group assignment, assessed the secondary parameters together" and "The blinding was maintained at all measurement points"
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "To ensure blinded evaluation of the FMS, videos of the assessment, where the patients sat on a chair and a mirror was placed 45° behind them, were sent to an experienced therapist off site" and "Two experienced physiotherapists, blinded with respect to group assignment, assessed the secondary parameters together" and "The blinding was maintained at all measurement points"
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	1 dropout occurred during the study period as the result of pneumonia, and 10 after the end of the intervention period until follow-up (6 were caused by being unavailable, 2 resulted from refusal to further participate and 2 were caused by cardiac conditions). ITT analysis was performed
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	1 dropout occurred during the study period as the result of pneumonia, and 10 after the end of the intervention period until follow-up (6 were caused by being unavailable, 2 resulted from refusal to further participate and 2 were caused by cardiac conditions). ITT analysis was performed
Selective reporting (reporting bias)	Low risk	All outcomes reported in the methods section and in the published trial protocol reported

Ilić 2016

Study characteristics	
Methods	Study design: RCT Number of dropouts: 1 (in the sham tDCS group due to a flu-like syndrome) Number of adverse events: none Deaths: none ITT: no
Participants	Country: Serbia

Ilić 2016 *(Continued)*

	Sample size: 26 (14 in experimental and 12 in control group) Inclusion criteria: single unilateral subcortical stroke, less than 9 month prior to study enrolment, age between 40 and 80 years, a severe hand motor deficit at stroke onset (MRC grade < 2) with subsequent recovery to a moderate level and the presence of hand movements, as evaluated using an UE-FM assessment score between 28–58 points and spasticity between 0–2, as assessed using the modified Ashworth Scale Exclusion criteria: any clinically significant or unstable medical disorder, a diagnosis of major depression, substance or alcohol abuse, or any neurological disorder other than stroke, including neglect, aphasia, hemianopia and serious cognitive impairment (MMSE score <24), no prior experience with tDCS, receiving central nervous system acting medications
Interventions	2 arms: 1. A-tDCS (2 mA for 20 minutes) prior to 45-minute intensive task-oriented motor training 5 times per week for 2 weeks 2. sham tDCS (2 mA for 60 seconds) prior to 45-minute intensive task-oriented motor training 5 times per week for 2 weeks
Outcomes	Outcomes were measured at baseline, after the first day, at the end of intervention period and at 1 month follow-up: 1. mJTT 2. UE-FM 3. grip strength (handheld dynamometer)
Funding source	The work of TVI was supported by the Ministry of Education and Science of the Republic of Serbia (Project No. 41014) and the Ministry of Defence of the Republic of Serbia (Project MFV-MA/07/16-18). The work of SDM was supported by a grant from the Ministry of Education and Science of the Republic of Serbia (Project No. 175012)
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Sealed opaque envelopes were used for randomization, and the procedure was performed by an external collaborator."
Allocation concealment (selection bias)	Low risk	Quote: "Sealed opaque envelopes were used for randomization, and the procedure was performed by an external collaborator."
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	Participants were blinded, whereas blinding of personnel was not described.
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants were blinded, whereas blinding of personnel was not described.
Blinding of outcome assessment (detection bias)	Low risk	Quote: "The treatment effects were assessed by a blind experienced rater"

Ilić 2016 *(Continued)*

Subjective outcome measures		
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "The treatment effects were assessed by a blind experienced rater"
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	1 person in the tDCS group was excluded from analysis due to a flu-like syndrome and 1 person in the sham group discontinued intervention
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	1 person in the tDCS group was excluded from analysis due to a flu-like syndrome and 1 person in the sham group discontinued intervention
Selective reporting (reporting bias)	Low risk	All outcomes in the published trial protocol have been published

Jo 2008a

Study characteristics	
Methods	Method: Randomised cross-over trial Number of dropouts: none Number of adverse effects: 6 Deaths: none ITT: yes
Participants	Country: Republic of Korea Sample size: 10 participants Inclusion criteria: unilateral right hemispheric stroke, younger than 70 years; noticeable cognitive disorder after stroke; written informed consent Exclusion criteria: seizures; metal implants in the head, cardiac pacemaker; history of neuropsychiatric diseases
Interventions	Each participant underwent one of the following treatments: 1. single session of A-tDCS over the DLPFC of the non-lesioned hemisphere (2 mA for 30 minutes) followed by a single session sham tDCS over the DLPFC of the non-lesioned hemisphere (2 mA for 10 seconds), separated by at least 48 hours wash-out period 2. single session sham tDCS over the DLPFC of the non-lesioned hemisphere (2 mA for 10 seconds) followed by single A-tDCS over the DLPFC of the non-lesioned hemisphere (2 mA for 30 minutes), separated by at least 48 hours wash-out period
Outcomes	Outcomes were measured at baseline and at the end of intervention period: 1. response accuracy 2. recognition accuracy

Jo 2008a *(Continued)*

	3. response time of a two-back verbal working memory task
Funding source	Supported by the Korea Research Foundation Grant funded by the Korean Government (KRF-2008-1093-000) and by a KOSEF grant funded by the Korean government (M10644000022-06N4400-02210)
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "The order of stimulation was randomly assigned for all participants"
Allocation concealment (selection bias)	Unclear risk	Not described by the authors
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants have been blinded by sham tDCS; blinding of personnel not stated
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Not described by the authors, however all outcome data were acquired by a computerised assessment during cognitive tasks
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All randomised participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcomes reported in the methods section reported

Kang 2008b

Study characteristics

Kang 2008b *(Continued)*

Methods	Method: randomised cross-over trial Dropouts: none Adverse effects: none (Paik 2015 [pers comm]) Deaths: none ITT: yes, all participants completed the study
Participants	Country: Republic of Korea Sample size: 10 people with stroke aged 48 to 84 years Inclusion criteria: not explicitly stated; written informed consent Exclusion criteria: cerebellar or brainstem lesion; metallic body implant; pacemaker; cochlear implant; history of seizure; unstable medical condition; inability to perform outcome tasks; Na+ or Ca++ channel blockers
Interventions	Each participant underwent one of the following treatments: 1. A-tDCS over the left DLPFC (2 mA for 20 minutes) followed by sham tDCS over the left DLPFC (2 mA for 1 minute), separated by at least 48 hours wash-out period 2. S=sham tDCS over the left DLPFC (2 mA for 1 minute) followed by A-tDCS over the left DLPFC (2 mA for 20 minutes), separated by at least 48 hours wash-out period
Outcomes	Outcomes were measured at baseline, at the end of intervention period and at 3 hours postintervention: 1. attention (Go/No-Go test)
Funding source	This research was supported by a grant from Seoul National University College of Medicine (Grant No. 800-20060236) to NJ Paik, and by a grant from the Korean Geriatric Society to EK Kang
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Quote: "We applied random order using computerized program. Randominzation program is freely available in the Internet." (Paik 2015 [pers comm]) Comment: However, patient-ID and first session stimulation type were continuously alternated, as can be seen in Table 1
Allocation concealment (selection bias)	Unclear risk	Not described by the study authors
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of participants and personnel (performance bias)	Low risk	Participants were blinded; blinding of personnel not stated

Kang 2008b *(Continued)*

Objective outcome measures		
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Outcome assessor was blinded Quote: "Both patients and the investigator that carried out the behavioral measurements were unaware of the type of intervention, because tDCS and sham were administered by another investigator who did not participate in the behavioral task or data analysis"
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All randomised participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcomes reported in the methods section reported. There was no published a priori trial protocol (Paik 2015 [pers comm])

Khedr 2013

Study characteristics	
Methods	Study design: RCT (parallel assignment) Dropouts: none Adverse effects: none Deaths: none ITT: yes, all participants completed the study
Participants	Country: Egypt Number of participants: 40 outpatients Age: (mean ± SD) years Gender: 14 women (35%) Type of stroke: acute single thromboembolic non-haemorrhagic infarction, documented by MRI Time poststroke: (mean ± SD) 17.1 ± 3.6 days Severity: (range) 7 to 13 on NIHSS Exclusion criteria: extensive infarction (all territories of MCA), severe flaccid hemiplegia, head injury, neurological disease other than stroke, renal or hepatic impairment, previous administration of tranquilliser, inability to give informed consent, no MEP recorded from FDI muscle of the affected hand

Khedr 2013 *(Continued)*

Interventions	3 arms: 1. A-tDCS, 25 minutes at 2 mA daily for 6 consecutive days on M1 of the lesioned hemisphere, delivered by saline-soaked pads (5 x 7 cm) 2. C-tDCS, 25 minutes at 2 mA daily for 6 consecutive days on M1 of the non-lesioned hemisphere, delivered by saline-soaked pads (5 x 7 cm) 3. sham tDCS, 25 minutes daily (with a short ramp-up and ramp-down of the current at the beginning and at the end of each session) for 6 consecutive days on M1 of the lesioned hemisphere
Outcomes	1. NIHSS at baseline, at the end of the intervention period and at 1, 2 and 3-month follow-up (0 to 42, with higher scores indicating a more severe stroke) 2. OMCASS at baseline, at the end of the intervention period and at 1, 2 and 3-month follow-up (0 to 100, with higher scores indicating no clinical impairment due to stroke) 3. BI at baseline, at the end of the intervention period and at 1, 2 and 3-month follow-up (0 to 100, with higher scores indicating better global function) 4. Muscle strength according to MRC at the end of the intervention period, at 1, 2 and 3-month follow-up (0 to 5, with higher scores indicating higher muscle strength) 5. Cortical excitability (as measured by RMT and AMT) at the end of the intervention period, at 1, 2 and 3-month follow-up (with greater intensity indicating a higher threshold)
Funding source	The review author(s) received no financial support for the research, authorship, and/or publication of this article
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Each patient was given a serial number from a computer-generated randomisation table"
Allocation concealment (selection bias)	Low risk	Quote: "Group allocations (Anodal, Cathodal, or Sham) were placed in serially numbered, opaque closed envelopes ... and each patient was placed in the appropriate group after opening the corresponding sealed envelope"
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	Participants and therapists were blinded
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants and therapists were blinded
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Outcome assessor was blinded
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Outcome assessor was blinded

Khedr 2013 *(Continued)*

Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	All randomised participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All randomised participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Low risk	All outcomes stated in the study protocol and listed in the methods section of the publication have been reported

Kim 2009

Study characteristics	
Methods	Study design: single-blinded, sham-controlled, randomised cross-over study Dropouts: none Adverse effects: none Deaths: none ITT: yes
Participants	Country: Republic of Korea Number of participants: 10 subacute participants Age: (mean) 62.8 years Gender: seven women (70%) Type of stroke: first-ever stroke, as confirmed by MRI; 2 had haemorrhagic stroke (20%) Time poststroke: (mean) 6.4 weeks, range 3 to 12 weeks Severity: participants could grasp and release independently; degree of strength according to MRC was ≥ 3 but < 5 for all paretic finger flexors and extensors. Participants did not have a family history of seizure, could understand the purpose of the study and did not have any deformities or contractures of the fingers, hands, elbows and shoulders Inclusion criteria: not explicitly stated Exclusion criteria: not explicitly stated
Interventions	Each participant underwent 2 different stimulation conditions, each for 20 minutes, separated by at least 24 hours of rest: 1. A-tDCS (1 mA) over the primary motor cortex of the first dorsal interossei muscle of the lesioned hemisphere 2. sham tDCS over the primary motor cortex of the first dorsal interossei muscle of the lesioned hemisphere
Outcomes	1. Box and Block test (the transfer of as many wooden blocks as possible with the lesioned hand from 1 compartment to the other within 1 minute, with a high value indicating good function) and finger

Kim 2009 *(Continued)*

acceleration measurement (in g, with a higher value indicating higher acceleration) at baseline, at 5 minutes of stimulation, immediately and at 30 and 60 minutes after stimulation

2. Visual analogue scales to assess attention and fatigue (score 1 to 7; 1 = no attention/fatigue; 7 = highest level of attention/fatigue) at baseline, immediately and at 30 and 60 minutes after stimulation

Funding source	None reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "A doctor who works in tDCS's room, he randomised patients on his own sequence" (Kim 2013 [pers comm])
Allocation concealment (selection bias)	Unclear risk	Quote: "A doctor who works in tDCS's room, he randomised patients on his own sequence" (Kim 2013 [pers comm])
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	Both participants and personnel were blinded (Kim 2013 [pers comm])
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Both participants and personnel were blinded (Kim 2013 [pers comm])
Blinding of outcome assessment (detection bias) Subjective outcome measures	High risk	No blinding of outcome assessors Quote: "An examiner who was aware of the stimulation method used was instructed not to communicate with patients during the task and evaluated patients' performances"
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	No blinding of outcome assessment, but the review authors judged that the outcome measurement is not likely to be influenced by lack of blinding Quote: "An examiner who was aware of the stimulation method used was instructed not to communicate with patients during the task and evaluated patients' performances"
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	All randomised participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All randomised participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcomes reported in the methods section reported

Kim 2010

Study characteristics	
Methods	Study design: double-blind sham-controlled multicentre randomised trial Dropouts: 1 participant discontinued treatment because of dizziness and another because of headache (2 out of 20) during follow-up Adverse effects: none Deaths: none ITT: no
Participants	Country: Republic of Korea Number of participants: 20 participants from neurorehabilitation units at 2 tertiary university hospitals Age: (mean ± SD) 57.27 ± 4.95 Gender: 7 women (35%) Type of stroke: first-ever cortical or subcortical ischaemic stroke Time poststroke: (mean ± SD) A-tDCS group: 34 ± 27.1 days; C-tDCS: 19.4 ± 9.3 days; sham tDCS: 22.9 ± 7.5 days Severity: mild to moderate motor deficits (MRC score ≥ 2) Inclusion criteria: first-ever ischaemic strokes in the cortical or subcortical area within the previous 2 months and mild to moderate motor deficits (MRC score ≥ 2) Exclusion criteria: cerebellar or brainstem lesions; presence of a metallic foreign body implant, such as a pacemaker or an artificial cochlea; history of seizure or another unstable medical condition; severe language disturbance; neglect, depression or cognitive deficits (based on the MMSE, 10 of 30 points) that would limit participation; history of severe alcohol or drug abuse; previous stroke that resulted in residual disability; premorbid arm impairment; and hemiplegic shoulder pain; use Na^+ or Ca^{2+}channel blockers or NMDA receptor antagonists
Interventions	Number of arms: 3 Each participant received 10 sessions (5 times per week for 2 weeks during conventional occupational therapy aiming at improving the co-ordination and strength of the paretic hand) of 1 of the following interventions: 1. A-tDCS over the primary motor cortex (M1) of the contralateral FDI muscle of the lesioned hemisphere (2 mA for 20 minutes) 2. C-tDCS over the M1 of the ipsilateral FDI of the non-lesioned hemisphere (2 mA for 20 minutes) 3. sham tDCS over the M1 of the contralateral FDI (for 20 minutes)
Outcomes	Outcomes used: FMA 0 to 66 (with higher scores indicating better function) for assessing upper limb motor function and MBI 0 to 100 (with higher scores indicating better global function) Time point of measurement: at baseline, 1 day and 6 months after intervention
Funding source	Supported by a grant from Helping Water Foundation (to NJP)
Notes	
Risk of bias	

Kim 2010 *(Continued)*

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Patients were randomly assigned to one of the three groups (atDCS, ctDCS or Sham treatment) using a stratified randomisation procedure with permuted block size of 3 and an algorithm that balanced Brunnstrom stages"
Allocation concealment (selection bias)	Low risk	Quote: "Sealed opaque envelopes were used for randomisation"
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	Participants and personnel were blinded
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants and personnel were blinded
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "Two independent raters blinded to the type of intervention performed outcome measurements"
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "Two independent raters blinded to the type of intervention performed outcome measurements"
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	1 participant of each interventional arm (14% each) discontinued intervention; we excluded these participants from analysis
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	1 participant of each interventional arm (14% each) discontinued intervention; we excluded these participants from analysis
Selective reporting (reporting bias)	Unclear risk	All outcomes reported in the methods section reported

Kim 2016

Study characteristics	
Methods	Study design: RCT Number of dropouts: not stated Number of adverse effects: not stated Deaths: not stated ITT: unclear

Kim 2016 *(Continued)*

Participants	Country: Republic of Korea Sample size: 30 (15 in experimental and 15 in control group) Inclusion criteria: stroke confirmed by CT or MRI Exclusion criteria: not described
Interventions	2 arms: 1. A-tDCS (1 mA for 20 minutes) during traditional occupational group therapy 2. sham tDCS (1 mA for 30 seconds) during traditional occupational group therapy
Outcomes	Outcomes were measured at baseline and at the end of intervention period: 1. FIM 2. MVPT (motor-free visual perception test)
Funding source	None reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Participants were blinded, blinding of personnel not described
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants were blinded, blinding of personnel not described
Blinding of outcome assessment (detection bias) Subjective outcome measures	High risk	Not described
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Not described
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated

Kim 2016 *(Continued)*

Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcomes listed in the methods section have been reported

Klomjai 2018

Study characteristics	
Methods	Study design: randomised cross-over study Number of dropouts: none Number of adverse effects: none Deaths: none ITT: yes
Participants	Country: Thailand Sample size: 38 Inclusion criteria: first-ever ischaemic stroke, confirmed by CT or MRI, with an onset ≤ 6 months, lower-limb weakness but able to perform sit-to-stand independently and walk without physical assistance for at least 3 metres Exclusion criteria: intracranial metal implants, cochlear implants, cardiac pacemaker, history of seizures, no clear neurological history, psychiatric disorders, excessive pain in any joint of the lower limb
Interventions	Each participant underwent the following conditions, separated by a wash-out period of ≥ 1 week: 1. dual tDCS (2 mA for 20 minutes) once prior to 60 minutes of physical therapy 2. sham tDCS (2 mA for 20 minutes) once prior to 60 minutes of physical therapy
Outcomes	Outcomes were measured at baseline and at the end of each intervention phase: 1. knee extensor strength 2. TUG 3. FTSST
Funding source	This work was supported by a research grant from the Faculty of Physical Therapy, Mahidol University (2016/018.2901)
Notes	

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Quote: "participants were randomly allocated to receive the real or sham experiment for their first experiment."

Klomjai 2018 *(Continued)*

Allocation concealment (selection bias)	Unclear risk	Quote: "participants were randomly allocated to receive the real or sham experiment for their first experiment."
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	Both were blinded Quote: "tDCS was applied by a researcher who was blinded to the outcome assessment and data analysis."
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Both were blinded Quote: "tDCS was applied by a researcher who was blinded to the outcome assessment and data analysis."
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "These outcome measures were evaluated before and after the intervention by a researcher who was blinded to the intervention."
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "These outcome measures were evaluated before and after the intervention by a researcher who was blinded to the intervention."
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Low risk	All outcomes listed in the prospectively registered trial protocol have been reported

Ko 2008a

Study characteristics	
Methods	Method: randomised cross-over trial Number of dropouts: not described Number of adverse effects: none Deaths: none ITT: yes, all participants completed the study
Participants	Country: Republic of Korea Sample size: 15 people with stroke and neglect Baseline characteristics: 10 men and 5 women; mean age (SD): 62 (9) years; time since stroke (range) 29-99 days; right-hemispheric stroke; right-handed

Ko 2008a *(Continued)*

	Inclusion criteria: not explicitly described; written informed consent Exclusion criteria: metal in the head or skin lesions in the electrode area; uncontrolled medical problems; severe cognitive impairments
Interventions	Each participant underwent one of the following conditions 1. A-tDCS over the right posterior parietal cortex (PPC) (2 mA for 20 minutes) followed by sham tDCS (2 mA for 10 seconds), divided by 48 hours of wash-out period 2. sham tDCS (2 mA for 10 seconds) followed by A-tDCS over the right posterior parietal cortex (PPC) (2 mA for 20 minutes), divided by 48 hours of wash-out period
Outcomes	Outcomes were measured at baseline and at the end of intervention period: 1. Line bisection test 2. Letter-structured cancellation test 3. Shape-unstructured cancellation test
Funding source	This work was supported by the Korea Science and Engineering Foundation (KOSEF) grant funded by the Korean Government (MOST) (No. M10644000022-06N4400-02210)
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "All of patients participated in both anodal and sham DC brain polarization with counterbalanced and randomized order and 48 hour interval between two sessions"
Allocation concealment (selection bias)	Unclear risk	Not described by the study authors
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of participants and personnel (performance bias) Objective outcome measures	Unclear risk	Participants were blinded, whereas blinding of personnel was not stated; however the review authors judged that the outcome measurement is not likely to be influenced by lack of blinding
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias) Objective outcome measures	Unclear risk	Not described by the study authors
Incomplete outcome data (attrition bias)	Low risk	There were no subjective outcome measures

Ko 2008a *(Continued)*

Subjective outcome measures		
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcomes reported in the methods section reported

Koo 2018

Study characteristics	
Methods	Study design: RCT Number of dropouts: none Number of adverse effects: not reported Deaths: none ITT: yes
Participants	Country: Republic of Korea Sample size: 24 (12 in experimental and 12 in control group) Inclusion criteria: within first month of first-ever unilateral ischaemic or haemorrhagic stroke; impairment in at least one of the pin prick, light touch, or proprioception parameters during a bedside screening evaluation; motor strength of the affected upper extremity ≥ grade 1 on the MRC Scale; sufficient cognitive function to follow simple commands (MMSE ≥ 20) Exclusion criteria: difficulty in communicating and with aphasia or severe dysarthria; moderate to severe spasticity in all joints of the affected limb (MAS ≥ 2); serious vision or visual perception impairments; a history of diabetic neuropathy and/or other peripheral neuropathies; and (5) other severe psychologic, neuromuscular, or orthopedic diseases
Interventions	2 arms: 1. A-tDCS (1 mA for 20 minutes) over the S1 of the affected hemisphere during 10 stimulation sessions over 10 days 2. sham tDCS (1 mA for 20 seconds) over the S1 of the affected hemisphere during 10 stimulation sessions over 10 days
Outcomes	Outcomes were measured at baseline and at the end of intervention
Funding source	None reported
Notes	

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Quote: "The participants were randomly assigned to the anodal and sham stimulation groups by simple randomization"

Koo 2018 *(Continued)*

Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Participants were blinded, blinding of personnel not described Quote: "The participants were blinded by using a sham stimulation. The experimenter who applied the intervention was different from the examiner determining the outcome measures."
Blinding of participants and personnel (performance bias) Objective outcome measures	Unclear risk	Participants were blinded, blinding of personnel not described Quote: "The participants were blinded by using a sham stimulation. The experimenter who applied the intervention was different from the examiner determining the outcome measures."
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "examiners were blinded to the stimulation condition"
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "examiners were blinded to the stimulation condition"
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Low risk	All outcome measures listed in the published a priori protocol have been reported

Lee 2014

Study characteristics	
Methods	Method: RCT Number of dropouts: 5 (3 out of 42 in the experimental groups (7%) and 2 out of 22 in the control group (9%)) Number of adverse effects: no major adverse events Deaths: none ITT: no
Participants	Country: Republic of Korea Sample size: 59 people with stroke (39 in the experimental groups and 20 in the control group)

Lee 2014 *(Continued)*

	Inclusion criteria: unilateral hemiparesis caused by stroke; first stroke within 1 month prior to enrolment; shoulder motor strength Medical Research Council grade ≤ 2 Exclusion criteria: contraindications to brain stimulation; previous history of brain neurosurgery or epilepsy; metallic implants in the brain; severe cognitive impairment; aphasia interfering with understanding study instructions; poor sitting balance; impaired vision; hemispatial neglect
Interventions	3 arms: 1. C-tDCS over the hand area of M1 over the non-lesioned hemisphere (2 mA for 20 minutes) during occupational therapy aiming at functional improvement of the affected arm for 30 minutes per day, 5 times a week for 3 weeks; 2. virtual reality training aiming at functional improvement of the affected arm for 30 minutes per day, 5 times a week for 3 weeks; 3. C-tDCS plus virtual reality training aiming at functional improvement of the affected arm for 30 minutes per day, 5 times a week for 3 weeks
Outcomes	Outcomes were measured at baseline and at the end of intervention period 1. Modified Ashworth Scale 2. Manual Muscle Testing 3. Manual Function Test 4. Fugl-Meyer assessment, upper extremity subscale 5. Korean-Modified Barthel Index
Funding source	None reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "All of the enrolled patients were randomly assigned to 1 of 3 groups using a table of random numbers"
Allocation concealment (selection bias)	Unclear risk	Not described by the study authors
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	Participants and personnel providing the base treatment were blinded
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants and personnel providing the base treatment were blinded
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "All evaluations were performed before and immediately after treatment by a single experienced occupational therapist who was not aware of the treatment allocation"
Blinding of outcome assessment (detection bias)	Low risk	Quote: "All evaluations were performed before and immediately after treatment by a single experienced occupational therapist who was not aware of the treatment allocation"

Lee 2014 *(Continued)*

Objective outcome measures		
Incomplete outcome data (attrition bias) Subjective outcome measures	High risk	3 participants out of 42 (7%) in the experimental groups and 2 out of 22 (9%) were lost to follow-up and excluded from the analysis. 2 out of the 3 losses to follow-up in the experimental group dropped out due to "medical problem(s)"
Incomplete outcome data (attrition bias) Objective outcome measures	High risk	3 participants out of 42 (7%) in the experimental groups and 2 out of 22 (9%) were lost to follow-up and excluded from the analysis. 2 out of the 3 losses to follow-up in the experimental group dropped out due to "medical problem(s)"
Selective reporting (reporting bias)	Unclear risk	All outcomes listed in the methods section reported

Lindenberg 2010

Study characteristics	
Methods	Study design: sham-controlled double-blinded randomised trial Dropouts: not stated Adverse effects: none Deaths: not stated, likely none ITT: not stated
Participants	Country: USA Number of participants: 20 chronic stroke participants Age: (mean ± SD) 55.8 ± 12.9 years Gender: 5 women (25%) Type of stroke: first and only ischaemic stroke Time poststroke: (mean ± SD) 40.3 ± 23.4 months Severity: UE-FM Score (mean ± SD) 39.8 ± 11.5 Inclusion criteria: ischaemic stroke in the territory of the medial cerebral artery at least 5 months before enrolment; no previous or subsequent strokes; MRC strength grade of 3/5 in extensor muscles of the lesioned upper extremity in the acute phase with at least 15 degrees of active wrist dorsiflexion at enrolment Exclusion criteria: additional neurological or psychiatric disorders; concurrent use of CNS-affecting drugs
Interventions	Number of arms: 2, each participant underwent 5 consecutive sessions of physical therapy/occupational therapy and 1 of the following interventions 1. Dual-tDCS: A-tDCS over M1 of the lesioned hemisphere + C-tDCS over M1 of the non-lesioned hemisphere (1.5 mA each, for 30 minutes) 2. Sham tDCS (for 30 minutes)

Lindenberg 2010 *(Continued)*

Outcomes	Primary outcome measure: UE-FM scores (0 to 66, with higher scores reflecting better motor performance) Secondary outcome measure: WMFT (with lower scores indicating better motor performance) Time point of measurement: at baseline and at 3 and 7 days after the last intervention session
Funding source	Supported by the NIH/NINDS (NS045049)
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Patients were randomly assigned to one of two groups ... using a block randomisation with 3 strata of impairment"
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants and personnel were blinded
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "Each patient underwent motor impairment assessments and MRI at baseline and after the intervention, conducted by trained individuals who were blinded to the type of intervention the patients received"
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	All randomised participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcomes stated in the methods section were reported

Mahmoudi 2011

Study characteristics	
Methods	Study design: sham-controlled cross-over randomised trial Dropouts: not stated, most likely none Adverse effects: none Deaths: not stated, most likely none ITT: not stated
Participants	Country: Iran Number of participants: 10 right-handed stroke participants with no sensory deficits Age: (mean ± SD) 60.8 ± 14.1 years Gender: 3 women (30%) Type of stroke: ischaemic Time poststroke: (mean ± SD) 8.3 ± 5.45, range 1 to 16 months Severity: median Brunnstrom stage 6 Inclusion criteria: single ischaemic stroke with more than 1 month's duration of mild to moderate motor deficit (to ensure that all participants could perform all items on the JTT Exclusion criteria: clinically significant or unstable medical or psychiatric disorder with history of substance abuse, any neuropsychiatric comorbidity other than stroke and contraindications to tDCS
Interventions	Each participant underwent 5 different treatments with at least 4 days of each of the following: 1. A-tDCS of lesioned M1 (with the cathodal electrode positioned at the contralateral supraorbital area, 1 mA for 20 minutes) 2. A-tDCS of lesioned M1 (with the cathodal electrode positioned at the contralateral deltoid muscle, 1 mA for 20 minutes) 3. C-tDCS of lesioned M1 (with the anodal electrode positioned at the contralateral supraorbital area, 1 mA for 20 minutes) 4. dual-tDCS: A-tDCS of lesioned M1 + C-tDCS of non-lesioned M1 5. sham tDCS (20 minutes)
Outcomes	Outcomes used: JTT (with familiarisation sessions) Time points of measurement: at baseline and after stimulation
Funding source	This study was partially supported by an American Heart Association (AHA) grant (grant number 0735535T)
Notes	

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Quote: "The order of these conditions was counterbalanced and randomised across patients"

Mahmoudi 2011 *(Continued)*

Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants probably were blinded; blinding of personnel was not described. Quote: "Patients were then randomised to the double-blinded, sham-controlled cross over part of the experiment"
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "A blinded physiatrist—instructed not to communicate with the patients during the task—evaluated patients' performance"
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcomes stated in the methods section were reported

Manji 2018

Study characteristics	
Methods	Study design: randomised sham-controlled cross-over trial Number of dropouts: none Number of adverse effects: not reported Deaths: none ITT: yes
Participants	Country: Japan Sample size: 30 (15 in experimental and 15 in control group)

Manji 2018 *(Continued)*

	Inclusion criteria: new onset supratentorial lesion with resulting gait disorder, the ability to walk 20 metres with supervision or slight assistance, and the ability to undergo body-weight-supported treadmill training (BWSTT) Exclusion criteria: orthopedic/systemic diseases that limit exercise therapy, severe dementia/higher brain dysfunction with difficulties in understanding instructions, implanted metal in the head or implanted cardiac pacemaker, and difficulties in undergoing BWSTT, as judged by a physician
Interventions	All participants underwent both of the following conditions in a randomised order: 1. A-tDCS over SMA of the lesioned hemisphere (1 mA for 20 minutes) during BWSTT 2. sham tDCS over SMA of the lesioned hemisphere (1 mA for 20 minutes) during BWSTT
Outcomes	Outcomes were measured at baseline and at the end of each intervention period: 1. gait speed (10 metre walk test) 2. TUG 3. LE-FM 4. Performance Oriented Mobility Assessment 5. Trunk Impairment Scale
Funding source	None reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described by the study authors
Allocation concealment (selection bias)	Unclear risk	Not described by the study authors
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	Quote: "The real/sham stimulation was set by entering a password, which prevents the subjects/persons performing the intervention from knowing the type of stimulation applied."
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Quote: "The real/sham stimulation was set by entering a password, which prevents the subjects/persons performing the intervention from knowing the type of stimulation applied."
Blinding of outcome assessment (detection bias) Subjective outcome measures	Unclear risk	Not described by the study authors
Blinding of outcome assessment (detection bias) Objective outcome measures	Unclear risk	Not described by the study authors

Manji 2018 *(Continued)*

Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	No published a priori protocol identified, all outcomes stated in the methods section were reported

Mazzoleni 2019

Study characteristics	
Methods	Study design: RCT Number of dropouts: 1 (in the sham control group) Number of adverse effects: none Deaths: none ITT: no
Participants	Country: Italy Sample size: 40 (20 in experimental and 20 in control group) Inclusion criteria: first supratentorial stroke within 25 ± 7 days post-stroke; upper limb hemiparesis; cognitive and speech abilities sufficient to understand instructions and to provide informed consent; absence of intense pain due to passive wrist mobilization assessed by VAS < 3 (range 0-10); ability to provide written informed consent Exclusion criteria: previous epilepsy seizures, severe EEG abnormalities, previous neurosurgery interventions including metallic elements, anticonvulsant medications, inability to keep sitting posture and other current severe medical problems
Interventions	2 arms: 1. A-tDCS over M1 of the affected hemisphere (2 mA for 20 minutes) at the beginning of a 30-minute training session of robotic assisted wrist training, 5 times a week for 6 weeks 2. sham tDCS over M1 of the affected hemisphere (2 mA for 5 seconds) at the beginning of a 30-minute training session of robotic assisted wrist training, 5 times a week for 6 weeks
Outcomes	Outcomes were measured at baseline and at the end of intervention period: 1. UE-FM 2. MAS 3. MI 4. BBT 5. kinematic data
Funding source	None reported

Mazzoleni 2019 *(Continued)*

Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described by the study authors
Allocation concealment (selection bias)	Unclear risk	Not described by the study authors
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Participants apparently were blinded, but personnel were not
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants apparently were blinded, but personnel were not
Blinding of outcome assessment (detection bias) Subjective outcome measures	High risk	Not described by the study authors
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Not described by the study authors
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	There was 1 dropout in the sham group due to robot failure
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	There was 1 dropout in the sham group due to robot failure
Selective reporting (reporting bias)	Unclear risk	The long-term follow-up measurements 6 months post stroke, mentioned in the published protocol, were not reported

Mortensen 2016

Study characteristics

Methods	Study design: RCT Number of dropouts: 1 in the A-tDCS group Number of adverse effects: 6 (3 in CTL and 3 in sham group, respectively)

Mortensen 2016 *(Continued)*

	Deaths: none ITT: no
Participants	Country: Denmark Sample size: 15 (8 in experimental and 7 in control group) Inclusion criteria: age 18 to 80 years, between 6 months and 5 years post stroke Exclusion criteria: haemorrhagic stroke due to trauma, epilepsy, metal implants in the head, other neurological diseases, cognitive disabilities and residence > 100 km away from the rehabilitation hospital
Interventions	2 arms: 1. A-tDCS (1.5 mA for 20 minutes) over ipsilesional M1 during occupational therapy on 5 consecutive days 2. sham tDCS (1.5 mA for 30 seconds) over ipsilesional M1 during occupational therapy on 5 consecutive days
Outcomes	Outcomes were measured at baseline and at the end of intervention period: 1. JTT 2. grip strength (handheld dynamometer)
Funding source	This study was financially supported by the BEVICA foundation
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "A stratified block randomization approach was used to ensure that patients with mild and moderate upper limb impairment were evenly distributed in the two treatment groups. [...] The online software GraphPad proposed by Suresh [20] was used for randomization."
Allocation concealment (selection bias)	Low risk	Quote: "A colleague with no information about patients was given a list of numbers 1–8 for each stratum and randomized the 16 patients to the two treatment groups accordingly. [...] Treatment allocation was revealed after follow-up assessment of the last patient."
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Participants were blinded. Blinding of personnel not described by the study authors
Blinding of participants and personnel (performance bias) Objective outcome measures	Unclear risk	Participants were blinded. Blinding of personnel not described by the study authors
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "The primary investigator then carried out data collection blind to treatment allocation."

Mortensen 2016 *(Continued)*

Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "The primary investigator then carried out data collection blind to treatment allocation."
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	There was one dropout in the sham group due to worsened hand function between baseline assessment and first treatment
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	There was one dropout in the sham group due to worsened hand function between baseline assessment and first treatment
Selective reporting (reporting bias)	Low risk	There is a published protocol of the study (NCT01992991). All outcome measurements have been reported at their pre-specified time points

Nair 2011

Study characteristics	
Methods	Study design: randomised double-blind sham-controlled trial Dropouts: none Adverse effects: none Deaths: none ITT: yes
Participants	Country: USA Number of participants: 14 right-handed Age: (mean) 55.8, range of 40 to 76 years Gender: 5 women (36%) Type of stroke: first-ever unihemispheric stroke, 6 (43%) had right-hemispheric stroke, 9 (64%) had predominantly cortical stroke, 5 (36%) had predominantly subcortical stroke Time poststroke: (mean ± SD) Severity: moderate to severe upper extremity impairment, UE-FM (mean ± SD) 30.1 ± 10.4 Inclusion criteria: not clearly stated Exclusion criteria: previous history of stroke, bilateral infarcts, haemorrhage, arthritis, chronic pain, other neurological diseases
Interventions	Number of arms: 2 participants underwent occupational therapy + 1 of the following conditions: 1. C-tDCS over M1 of the non-lesioned hemisphere (1 mA for 30 minutes) 2. sham tDCS over M1 of the non-lesioned hemisphere (for 30 minutes)
Outcomes	Primary outcomes: mean ROM for shoulder abduction, elbow extension and wrist extension (3J-ROM; calculated as active ROM*100/passive ROM for each joint, 0 to 100, with higher values indicating bet-

Nair 2011 *(Continued)*

	ter function) and proportional change in UE-FM (0 to 66, with higher scores indicating better motor performance) Time point of measurement: at baseline, after the intervention and at 1-week follow-up
Funding source	This research work was supported by grants from the National Institute of Health (RO1 NS045049, RO1DC008796), CIMIT, Mary Crown and William Ellis Family Fund
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described, quote: "Patients were randomised to either the cathodal group or the sham group"
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	There were no subjective outcome measures.
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants and personnel were blinded
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "The 3J-ROM and the FM assessments were done by an investigator who was blind with regard to whether real tDCS or sham tDCS was applied"
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All randomised participants completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	High risk	Results of Wolf Motor Function Test, Modified Ashworth Scale and Motor Activity Log Rating Scale were not reported, as intended by the protocol (http://ClinicalTrials.gov/show/NCT00792428)

Nicolo 2017

Study characteristics	
Methods	Study design: RCT Number of dropouts: none Number of adverse effects: none Deaths: none ITT: yes
Participants	Country: Switzerland Sample size: 41 (28 in experimental groups and 13 in control group) Inclusion criteria: unilateral stroke with resulting deficits in motor function and significantly impaired activities in daily living at enrolment Exclusion criteria: epilepsy; metal in the head; implants; pregnancy; sleep deprivation; recent traumatic brain injury; delirium or disturbed vigilance; inability to participate in 1 hour treatment sessions; severe language comprehension deficits; skull breach; recurrent stroke during rehabilitation; medical complications
Interventions	3 arms: 1. C-tDCS over the motor cortex of the unaffected hemisphere (25 minutes) 3 times per week for 3 weeks during upper extremity functional motor training sessions 2. continuous Theta Burst Stimulation (cTBS) over the motor cortex of the unaffected hemisphere (267 bursts, each consisting of three pulses at 30 Hz, repeated at inter-burst intervals of 167 ms); 2 stimulation trains of 30 seconds (separated by 15 minutes) will be applied 3 times per week for 3 weeks immediately after physical therapy 3. sham group (half of the participants will receive sham cTBS and half will receive sham tDCS)
Outcomes	Outcomes were measured at baseline and at the end of intervention period and at 1 month follow-up Primary outcome measures: 1. Change in compound motor score slope at week 4 (UE-FM, 9-HPT, Jamar dynamometer strength normalised to the healthy arm and averaged to a compound motor score) 2. Change in alpha-band coherence between affected motor cortex and the rest of the brain Secondary outcome measures: 1. Change in UE-FM at week 4 2. Change in UE-FM at week 8 3. Change in alpha-band coherence between the unaffected motor cortex and the rest of the brain 4. Change in MAL at week 4 5. Change in MAL at week 8 6. Number of adverse events at week 4 7. Number of adverse events at week 8 8. Other outcome measures: 9. Total UE-FM at week 4 10.Total UE-FM at week 8 11.Change in average velocity in pegs/sec at week 4 12.Change in average velocity in pegs/sec at week 8 13.Change in Jamar dynamometer strength at week 4 14.Change in Jamar dynamometer strength at week 8 15.Change in score of the BBT at week 4

Nicolo 2017 *(Continued)*

	16.Change in score of the BBT at week 8 17.Correlation between change in alpha-band coherence and clinical improvements at week 4 18.Change in fractional anisotropy of the affected corticospinal tract at week 4 19.Change in correlations of spontaneous fMRI fluctuations within the motor network
Funding source	Supported by the Swiss National Science Foundation (grant no. 320030_146639)
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Randomization was stratified for initial motor impairment and stroke lateralization, with an allocation sequence based on a block size of 3, generated with a computer random number generator by a researcher not involved in recruitment."
Allocation concealment (selection bias)	Unclear risk	Not described by the study authors
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Participants were blinded, whereas personnel were not
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants were blinded, whereas personnel were not
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "Motor function was assessed by a trained therapist who was blinded to treatment allocation"
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Not described by the study authors
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	All randomised participants apparently completed the study; no treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All randomised participants apparently completed the study; no treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Low risk	All outcomes in the published trial protocol have been reported

Park 2013

Study characteristics	
Methods	Method: RCT Number of dropouts: unclear Number of adverse effects: none Deaths: none ITT: unclear
Participants	Country: Republic of Korea Sample size: 11 participants Inclusion criteria: not explicitly stated; newly diagnosed with radiologically confirmed stroke; written informed consent Exclusion criteria: patients with metal in the head or with skin lesions in the electrode area; significant aphasia
Interventions	2 arms: 1. A-tDCS to the bilateral prefrontal cortex (2 mA for 30 minutes) with the cathode positioned at the non-dominant arm + computer-assisted cognitive rehabilitation 5 times a week for 18.5 days 2. sham tDCS with the anode positioned over the bilateral prefrontal cortex (2 mA for 30 seconds) with the cathode positioned at the non-dominant arm + computer-assisted cognitive rehabilitation 5 times a week for 17.8 days
Outcomes	Outcomes were measured at baseline and at study end: 1. Korean Version of the MMSE 2. Seoul Computerized Neuropsychological Test (SCNT)
Funding source	This study was supported by a grant (Project No: 2012-02-001) of the CNUH-BRI
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Quote: "The patients were randomly assigned to two groups"
Allocation concealment (selection bias)	Unclear risk	Not described by the study authors
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Patients were blinded; whereas blinding of personnel was not clearly described by the authors: "The tDCS and the cognitive function test were performed by two independent personnel"
Blinding of participants and personnel (performance bias)	Low risk	Patients were blinded; whereas blinding of personnel was not clearly described by the authors: "The tDCS and the cognitive function test were performed by two independent personnel"

Park 2013 *(Continued)*

Objective outcome measures		
Blinding of outcome assessment (detection bias) Subjective outcome measures	Unclear risk	Quote: "The tDCS and the cognitive function test were performed by two independent personnel"
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "The tDCS and the cognitive function test were performed by two independent personnel."
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	All randomised participants apparently completed the study; no treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	All randomised participants apparently completed the study; no treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	Not all of the 10 dimensions of the Seoul Computerized Neuropsychological Test (SCNT), as stated in the methods section, have been reported

Park 2015

Study characteristics	
Methods	Study design: RCT Number of dropouts: none Number of adverse effects: not described Deaths: none ITT: yes
Participants	Country: Republic of Korea Sample size: 24 (8 in experimental and 16 in control groups) Inclusion criteria: no explicite criteria stated, but included were people with hemiplegia due to stroke >6 months post-stroke Exclusion criteria: no explicite criteria stated, but excluded were people with inability to walk, implanted pacemaker, MAS <2, osteoarhritis
Interventions	3 arms: 1. A-tDCS (2 mA for 15 minutes) over the left [sic!] M1 during task-related training for improving mobility for 30 minutes a day, 3 times per week for 4 weeks 2. sham tDCS (dosage not described) over the left [sic] M1 during task-related training for improving mobility for 30 minutes a day, 3 times per week for 4 weeks 3. task-related training for improving mobility only for 30 minutes a day, 3 times per week for 4 weeks

Park 2015 *(Continued)*

Outcomes	Outcomes were measured at baseline and at the end of intervention: 1. gait velocity 2. spatial gait paremeters (symmetry profile of stance phase, swing phase and step length)
Funding source	This paper was supported by research funds provided from Howon University, Republic of Korea
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described by the study authors
Allocation concealment (selection bias)	Unclear risk	Not described by the study authors
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Participants apparently were blinded, whereas blinding of personnel was not described
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants apparently were blinded, whereas blinding of personnel was not described.
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Not described by the study authors
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	All randomised participants apparently completed the study; no treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All randomised participants apparently completed the study; no treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	No published trial protocol could be identified. All outcomes stated in the methods section have been reported

Picelli 2015

Study characteristics	
Methods	Study design: RCT Number of dropouts: none Number of adverse effects: none Deaths: none ITT: yes
Participants	Country: Italy Sample size: 30 (20 in experimental and 10 in control groups, respectively) Inclusion criteria: age > 18 years; first-ever unilateral ischaemic stroke (as documented by CT or MRI); at least 6 months since stroke onset; and MMSE score > 24 Exclusion criteria: botulinum toxin injection into the affected leg muscles or rehabilitation treatment in the 4 months before recruitment; participation in other trials; a history of epileptic fits; EEG suggesting increased cortical excitability; metallic brain or spinal implants; previous brain or spine surgery; medications altering CNS excitability (e.g. antiepileptics, neuroleptics, benzodiazepines or antidepressants) or with a presumed effect on CNS plasticity (e.g. dopamine, fluoxetine or D-amphetamine) deficits of somatic sensation involving the lower limbs (assessed by physical and neurological examination); posterior circulation stroke; vestibular disorders or paroxysmal vertigo; other neurological or orthopaedic conditions involving the lower limbs (musculoskeletal diseases, severe osteoarthritis, peripheral neuropathy, joint replacement); cardiovascular co-morbidity (recent myocardial infarction, heart failure, uncontrolled hypertension, orthostatic hypotension)
Interventions	3 arms: 1. anodal tDCS (2 mA for 20 minutes) over ipsilesional M1 + sham transcutaneous spinal direct current stimulation (tsDCS) during robot-assisted gait training 5 days per week for 2 weeks 2. sham tDCS (2 mA for 2 minutes) over ipsilesional M1 + cathodal tsDCS during robot-assisted gait training 5 days per week for 2 weeks 3. anodal tDCS (2 mA for 20 minutes) over ipsilesional M1 + cathodal tsDCS during robot-assisted gait training 5 days per week for 2 weeks
Outcomes	Outcomes were measured at baseline, at the end of intervention and at 2 and 4-week follow-up: 1. walking capacity (6 minute walk test) 2. walking ability (FAC) 3. muscle strength (MI) 4. muscle tone (Ashworth Scale) 5. cadence
Funding source	None reported
Notes	

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Quote: "The patients were allocated to one of the three treatment arms according to a balanced (restricted) software-generated randomization scheme."
Allocation concealment (selection bias)	Low risk	Quote: "When the decision was made, the investigator (L.R.) who determined whether a subject was eligible for inclusion in the trial was unaware of which

Picelli 2015 *(Continued)*

		group the subject would be allocated to (allocation was by sealed opaque envelopes). Another investigator (E.C.) checked for correct patient allocation according to the randomization list. After unmasking at the end of the study, we made sure that no errors had been made in allocation."
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Participants apparently were blinded, whereas blinding of personnel was not described
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants apparently were blinded, whereas blinding of personnel was not described
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "The same rater (P.C.), who was blinded to group allocation, evaluated all patients."
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "The same rater (P.C.), who was blinded to group allocation, evaluated all patients."
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	All randomised participants apparently completed the study; no treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	All randomised participants apparently completed the study; no treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	No published trial protocol could be identified, all outcomes listed in the methods section have been reported

Qu 2009

Study characteristics	
Methods	Study design: RCT Dropouts: none Adverse effects: not reported Deaths: none ITT: yes Duration: 1 month
Participants	Country: China

Qu 2009 *(Continued)*

	Number of participants: 50 Age: tDCS (mean ± SD): 45 (11), control: 45 (14) years Gender: tDCS: 21 (84%) men, control: 22 (88%) men Type of stroke: 15 (60%) ischaemic Time poststroke: tDCS: 6 months (3 to 36), control: 4 months (3 to 12) Severity: tDCS: FMA 12 (5 to 44), BI 64 (17), control: FMA 5 (2 to 35), BI: 72 ± 22 Inclusion criteria: admitted to hospital between June 2008 and June 2009 and MRI-confirmed stroke Exclusion criteria: not stated
Interventions	2 arms: 1. C-tDCS over lesioned M1 (0.5 mA for 20 minutes) once a day for 5 consecutive days, for 1 month + physical therapy (40 minutes/session, twice a day, for 5 times a week) 2. physical therapy (40 minutes/session, twice a day, for 5 times a week)
Outcomes	Outcomes used: MAS, FMA, BI Time points of measurement: at baseline and at the end of the intervention period
Funding source	None reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "Subjects were randomly assigned using a computer-generated randomisation list by a single investigator" (Wu 2013b [pers comm])
Allocation concealment (selection bias)	Unclear risk	Quote: "The assigned random number was inputted into the stimulator device by the same investigator. She did not participate in other parts of the study" (Wu 2013b [pers comm])
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Quote: "All other investigators, subjects, and outcome assessors remained blinded to group allocation until the completion of the final statistical analyses" (Wu 2013b [pers comm])
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Quote: "All other investigators, subjects, and outcome assessors remained blinded to group allocation until the completion of the final statistical analyses" (Wu 2013b [pers comm])
Blinding of outcome assessment (detection bias) Subjective outcome measures	Unclear risk	See "Blinding of participants and personnel"
Blinding of outcome assessment (detection bias)	Low risk	See "Blinding of participants and personnel"

Qu 2009 *(Continued)*

Objective outcome measures		
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcomes from the methods section were reported

Qu 2017

Study characteristics	
Methods	RCT
Participants	Country: China 45 patients with first-ever stroke, between 1 and 6 months after stroke
Interventions	3 arms: 1. Experimental group 1: traditional rehabilitation training + C-tDCS (1 mA for 20 minutes once a day for 2 weeks) 2. Experimental group 2: traditional rehabilitation training + C-tDCS (2 mA for 20 minutes once a day for 2 weeks) 3. Control: traditional rehabilitation training + S-tDCS (1 mA for 20 minutes once a day for 2 weeks)
Outcomes	Outcomes were assessed at baseline, and 2 weeks after the end of intervention: 1. UE-FM 2. ARAT 3. MBI
Funding source	None reported
Notes	Conference abstract

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Quote: "They were randomly divided into a 1.0 mA group, a 2.0 mA group, and a control group (n = 15 in each group) according to the random number table."
Allocation concealment (selection bias)	Unclear risk	Not described by the study authors

Qu 2017 *(Continued)*

Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Not described by the study authors
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	There were no objective outcome measures
Blinding of outcome assessment (detection bias) Subjective outcome measures	Unclear risk	Not described by the study authors
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	There were no objective outcome measures
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	Not described by the study authors
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	Not described by the study authors
Selective reporting (reporting bias)	Unclear risk	No published trial protocol could be identified

Rabadi 2017

Study characteristics	
Methods	Study design: RCT Number of dropouts: none during intervention phase, 4 until 3 month follow-up (3 in sham group and 1 in the C-tDCS group, respectively) Number of adverse effects: none Deaths: none ITT: yes
Participants	Country: USA Sample size: 16 (8 in experimental and 8 in control group) Inclusion criteria: unilateral, first, acute stroke event within 7 to 10 days of admission, ischaemic stroke documented clinically and by neuroimaging, severe arm-hand weakness (Medical Research Council (MRC) grade < 2), medically stable, written informed consent

Rabadi 2017 *(Continued)*

	Exclusion criteria: haemorrhagic stroke, previous stroke or history of epilepsy, medically unstable, demented, or terminally ill, botulinum toxin injection for spasticity or other medications known to enhance motor recovery such as d-amphetamine and L-dopa, implanted pacemakers or defibrillators, refusal to provide a written informed consent
Interventions	2 arms: 1. C-tDCS (1 mA for 30 minutes) over contralesional premotor cortex (PMC) plus 60 minutes of OT 2. sham tDCS (1 mA for 30 seconds) over contralesional premotor cortex (PMC) plus 60 minutes of OT
Outcomes	Outcomes were measured at baseline, at the end of intervention period and at follow-up: 1. ARAT 2. FIM
Funding source	VA pilot grant
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "[patients] were randomly assigned (1:1) by computer generated randomization to either experimental or control group in blocks of 4."
Allocation concealment (selection bias)	Low risk	Quote: "Neither the patient nor the therapist were aware of which group the patient was randomized to."
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	Participants and personnel were blinded
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants and personnel were blinded
Blinding of outcome assessment (detection bias) Subjective outcome measures	High risk	Not described by the study authors
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Not described by the study authors
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	There were no drop-outs during intervention phase, but 4 until 3 month follow-up (3 in sham group and 1 in the C-tDCS group, respectively). The reasons have not been stated
Incomplete outcome data (attrition bias)	Unclear risk	There were no drop-outs during intervention phase, but 4 until 3 month follow-up (3 in sham group and 1 in the C-tDCS group, respectively). The reasons have not been stated

Rabadi 2017 *(Continued)*

Objective outcome measures		
Selective reporting (reporting bias)	Low risk	There is a published trial protocol and all outcome measures have been reported. However, primary and secondary outcomes were switched

Rocha 2016

Study characteristics	
Methods	Study design: RCT Number of dropouts: 6 (2 in each of the experimental groups and 2 in the sham group) Number of adverse effects: none Deaths: not reported ITT: yes
Participants	Country: Brazil Sample size: 21 (7 in each of the 2 experimental groups and 7 in the sham group) Inclusion criteria: aged at 40 to 75 years, able to understand verbal commands, and able to perform some movement of active extension with the paretic wrist (against gravity) Exclusion criteria: spasticity scores at the wrist ≥ 3 MAS, pain ≥ 4 on the VAS, a history of neurological or psychiatric disease, a history of seizures, a cardiac pacemaker, previous surgery involving metallic implants in the skull (cochlear implants, aneurysm clips, and brain electrodes), and/or having already received mCIMT or tDCS treatment
Interventions	3 arms: 1. A-tDCS (1 mA for 13 minutes) over M1 of the affected hemisphere, 3 times a week for 4 consecutive weeks prior to an mCIMT protocol (6 continuous hours each day over 4 weeks) 2. C-tDCS (1 mA for 9 minutes) over M1 of the unaffected hemisphere, 3 times a week for 4 consecutive weeks prior to an mCIMT protocol (6 continuous hours each day over 4 weeks) 3. sham tDCS (1 mA for 30 seconds) over M1 of the affected hemisphere, 3 times a week for 4 consecutive weeks prior to an mCIMT protocol (6 continuous hours each day over 4 weeks)
Outcomes	Outcomes were measured at baseline, at the end of intervention period and at 1-month follow-up: 1. FMA 2. UE-FM 3. MAL 4. grip strength
Funding source	This research was supported by grant (number 484488/2013-9) from Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq). Sérgio Rocha Rocha was supported by Fudancao de Amparo a Ciência e Tecnologia do Estado de Pernambuco (FACEPE). Evelyn Silva and Águida Foerster was supported by CNPq
Notes	
Risk of bias	

Rocha 2016 *(Continued)*

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "The randomization was performed by an independent person who selected one of the sealed, sequentially numbered opaque envelopes minutes before the intervention began."
Allocation concealment (selection bias)	Low risk	Quote: "The randomization was performed by an independent person who selected one of the sealed, sequentially numbered opaque envelopes minutes before the intervention began."
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Patients were blinded Quote: "The patients were blinded to the tDCS protocols." Blinding of personnel not described by the study authors
Blinding of participants and personnel (performance bias) Objective outcome measures	Unclear risk	Patients were blinded Quote: "The patients were blinded to the tDCS protocols." Blinding of personnel not described by the authors
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Outcome assessors were blinded Quote: "The assessment of motor functions and the administration of the functional scales and questionnaires were performed by a trained staff member, blinded to patient group assignment."
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Outcome assessors were blinded Quote: "The assessment of motor functions and the administration of the functional scales and questionnaires were performed by a trained staff member, blinded to patient group assignment."
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	There were 2 dropouts out of 7 participants (28%) in each of the 3 groups due to unknown reasons. ITT analysis was performed
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	There were 2 dropouts out of 7 participants (28%) in each of the 3 groups due to unknown reasons. ITT analysis was performed
Selective reporting (reporting bias)	Unclear risk	There is a published protocol for this trial (NCT01879787). From initially 7 planned study arms, described in the protocol, the publication listed the results of 2 study arms. All outcome measures have been reported in the publication, except JTT

Rossi 2013

Study characteristics	
Methods	Study design: single-centre, randomised, double-blind, sham-controlled trial Dropouts: none Adverse effects: none

Rossi 2013 *(Continued)*

	Deaths: none ITT: yes, all participants completed the study
Participants	Country: Italy Number of participants: 50 Inclusion criteria: age between 18 and 80 years and an acute ischaemic lesion in the territory of the MCA, a score between 6 and 20 at the NIHSS and a UE-FM score between 15 and 55 Exclusion criteria: pre stroke mRS > 1, thrombolysis, history of seizure, advanced systemic diseases co-existent neurological/psychiatric diseases, current treatment with antidepressants, antipsychotics or benzodiazepines Age: (mean ± SD) tDCS-group: 66.1 (± 14.3); sham group: 70.3 (± 13.5) years Gender: tDCS group: 12 men (48%), sham group: 14 men (56%) Time poststroke: 2 days Severity according NIHSS at baseline: tDCS-group: 15.4 (± 4.9); sham group: 14.1 (± 3.5)
Interventions	Number of arms: 2; each participant underwent 1 of the following conditions 1. 5 daily sessions of A-tDCS to M1 of the lesioned hemisphere (2 mA for 20 minutes) 2. 5 daily sessions of sham tDCS (for 20 minutes)
Outcomes	Primary outcomes: UE-FM at baseline, at the end of intervention and at 3 month follow-up Secondary outcomes: NIHSS at baseline, at the end of intervention and at 3 month follow-up; mRS at baseline, at the end of intervention and at 3-month follow-up
Funding source	None reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomisation scheme was generated by a computer program (Koch 2013 [pers comm])
Allocation concealment (selection bias)	Unclear risk	Allocation was performed by a third person via telephone (Koch 2013 [pers comm])
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	Personnel were blinded to the type of treatment (Koch 2013 [pers comm])
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Personnel were blinded to the type of treatment (Koch 2013 [pers comm])
Blinding of outcome assessment (detection bias)	Low risk	Evaluators were blinded (Koch 2013 [pers comm])

Rossi 2013 *(Continued)*

Subjective outcome measures		
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Evaluators were blinded (Koch 2013 [pers comm])
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	All participants completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Low risk	All outcomes were stated as mentioned in preceding conference papers

Saeys 2015

Study characteristics	
Methods	Study design: RCT Number of dropouts: none reported Number of adverse effects: none of the patients reported adverse effects Deaths: none ITT: Yes
Participants	Country: Belgium Sample size: 31(16 in experimental and 15 in control group) Inclusion criteria: all patients with a history of first ischaemic or haemorrhagic stroke between 18 and 80 years and less than 4 months post-onset attending a rehabilitation programme were eligible for inclusion Exclusion criteria: patients with orthopaedic and neurological disorders, other than stroke, that could influence postural control were excluded
Interventions	2 arms: 1. 16 x 20-minute sessions of tDCS (intensity of 1.5mA). Electrodes were placed overlying the motor cortex (electrode centered on C4 or C3 of the 10–20 electroencephalogram system) whereas the anode (increases cortical excitability) was placed on the ipsilesional hemisphere and the cathode (decreases cortical excitability) on the intact hemisphere 2. 16 x 20-minute sessions of sham-tDCS stimulation
Outcomes	Outcomes were measured at baseline and after 4 weeks of intervention and after 8 weeks: Primary outcome: Tinetti test. Secondary outcome measures: Rivermead Motor Assessment, Trunk Impairment Scale

Saeys 2015 *(Continued)*

Funding source	None reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Method of random sequence generation not stated
Allocation concealment (selection bias)	Low risk	Quote: "All patients were randomly divided into two groups using sealed envelopes"
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	There were no subjective outcome measures
Blinding of participants and personnel (performance bias) Objective outcome measures	Unclear risk	Quote: "The regular therapist for a specific patient was blinded for study group assignment."
Blinding of outcome assessment (detection bias) Subjective outcome measures	Unclear risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias) Objective outcome measures	Unclear risk	Quote: "The regular therapist for a specific patient was blinded for study group assignment."
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	There were no subjective outcome measures
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	Study authors changed their primary and secondary outcomes from their protocol (NCT01356654)

Salazar 2019

Study characteristics

Methods	Study design: RCT Number of dropouts: none

Salazar 2019 *(Continued)*

	Number of adverse effects: no serious adverse effects occurred during the treatment Deaths: none ITT: yes (no dropouts)
Participants	Country: Brazil Sample size: 30 (15 in experimental and 15 in control group) Inclusion criteria: individuals with moderate and severe chronic hemiparesis after stroke Exclusion criteria: Individuals who presented shoulder pain, adhesive capsulitis or glenohumeral luxation and any contraindications for electrical stimulation were excluded
Interventions	2 arms: 1. bi-cephalic tDCS and FES, 5 times a week for 2 weeks 2. sham tDCS plus FES, 5 times a week for 2 weeks Both groups received 10 sessions, for 30 minutes of stimulation during the 2-week intervention period
Outcomes	Outcomes were measured at baseline and after 2 weeks Primary outcomes were: 1. motor performance measures such as: a. movement cycletime, seconds b. mean reachingphasevelocity, cm/s c. mean returningphasevelocity, cm/s d. peak velocity, cm/s 2. movement quality measures such as: a. smoothness, number of movement units, n b. trunk compensatorymovements, trunk forward inclination, % c. joint angles, elbow ROM Secondary outcomes were: 1. handgrip strength, kg 2. motor impairment, FMA-upper limb
Funding source	This study received financial support from Conselho Nacional de Pesquisa (CNPq) (grant universal 461254/2014-0) and in part by the Coordenacao de Aperfeicoamento de Pessoal de Nível Superior – Brasil (CAPES, finance code 001).
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	A computer-generated random number of sequences (http://www. random.com) was used
Allocation concealment (selection bias)	Unclear risk	Quote: "Concealed randomization was performed in blocks of 4 to 6 individuals"
Blinding of participants and personnel (performance bias)	Low risk	A blinded assessor asked patient about their perception of improvement

Salazar 2019 *(Continued)*

Subjective outcome measures		
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	A blinded assessor was used
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	A blinded assessor asked patient about their perception of improvement
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	A blinded assessor was used
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	All participants completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	Some outcomes reported differed from those listed in the protocol for the study (NCT02818608)

Sattler 2015

Study characteristics	
Methods	Study design: RCT Number of dropouts: none Number of adverse effects: no adverse effects were reported Deaths: none ITT: yes, all patients were analysed
Participants	Country: France Sample size: 20 (10 in experimental and 10 in control group) Inclusion criteria: first-ever, single, unilateral hemispheric ischaemic stroke within 4 weeks with mild to moderate motor deficit Exclusion criteria: cortical infarct with large hand/wrist M1 involvement, major depression or other severe psychiatric comorbidity, alcohol abuse, transcranial magnetic stimulation (TMS) contraindications
Interventions	2 arms: 1. tDCS combined with rPNS

Sattler 2015 *(Continued)*

	2. sham- tDCS combined with rPNS Each patient received 5 consecutive daily sessions of tDCS (anodal or sham), combined with rPNS on the paretic side. The peripheral and cortical stimulations were applied at the same time
Outcomes	Outcomes were measured at baseline and at the end of the intervention after 5 days, at 2 and 4 weeks' follow-up. Primary outcome: JTT Secondary outcomes: 1. maximum grip force of the hand 2. NHPT 3. Hand Tapping test (number of palm taps on a mechanical hand tapping for 10 seconds), and 4. FMA for the upper limb
Funding source	This work was supported by grants from Fondation de l'Avenir (ET9-531), by INSERM (C09-27), the Clinical Research Center of Toulouse (CIC), and Toulouse University Hospital
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "The randomization list was created by the Clinical Research Center of Toulouse using Rand List Software V1.2 (Dat Inf GmbH; www.randomisation.eu), which provided 5 blocks of 4 patients, each balanced between the sham and active interventions."
Allocation concealment (selection bias)	Unclear risk	Not described by the study authors
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	Participants were blinded. Therepists delivering base intervention were blind to group allocation Quote: "Therapists were blinded to group allocation." Personnel delivering tDCS were not blinded Quote: "All the investigators were blinded to the patient's allocation except the doctor who applied the stimulation."
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants were blinded. Therepists delivering base intervention were blind to group allocation Quote: "Therapists were blinded to group allocation." Personnel delivering tDCS were not blinded Quote: "All the investigators were blinded to the patient's allocation except the doctor who applied the stimulation."
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "The assessment of motor functions and the TMS study were performed by trained doctors, blinded to group assignment."
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "The assessment of motor functions and the TMS study were performed by trained doctors, blinded to group assignment."

Sattler 2015 *(Continued)*

Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	There is a published trial protocol (NCT01007136). All outcome measures listed in the protocol were reported, except the following: Medical Research Council grading scale, Barthel Index, Abilhand questionnaire, Ashworth Spasticity Scale, Beck Depression Inventory, Visual Analog Pain Scale, Mini Mental Status Scale, NIHSS, Motor Activity Log and fMRI overactivation in motor cortex: voxel count and intensity

Seo 2017

Study characteristics	
Methods	Study design: RCT Number of dropouts: none at first follow-up, 4 at second follow-up (2 in the control and 2 in the experimental group) Number of adverse effects: none described Deaths: none described ITT: yes, as described by the study authors
Participants	Country: Republic of Korea Sample size: 21 (11 in experimental and 10 in control group) Inclusion criteria: in the chronic phase at least after 6 months from stroke onset, unilateral hemiplegia, gait impairment with a FAC score ≤ 4, and adults with age ≥ 18 Exclusion criteria: 1) unstable vital signs, 2) history of seizure or cranial operation, 3) unable to walk independently before stroke onset, 4) metallic implants, such as a cardiac pacemaker or an artificial cochlea, 5) severe cognitive deficit, and 6) severely aphasic patients who could not communicate at all
Interventions	2 arms: 1. robotic-assisted gait training with anodal tDCS (anodal) group 2. robotic-assisted gait training with sham tDCS (sham)
Outcomes	Outcomes were measured before treatment (T0), immediately after treatment (T1), and 4 weeks after the end of treatment (T2), except for MEP, which was measured only at T0 and T1 Primary outcome measure: FAC score Secondary outcome measures included the 10-metre walking test (10MWT), 6-minute walking test (6MWT), BBS, FMA of lower extremity, and MRC for the hip, knee, and ankle joints Cortical excitability was measured using TMS on the leg motor cortex
Funding source	This study was supported by grant no: 04-2013-0810 from the SNUH Research Fund

Seo 2017 *(Continued)*

Notes

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "using a random table with an allocation ratio of 1:1"
Allocation concealment (selection bias)	Unclear risk	Concealment of allocation not described
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	There were no subjective outcome measures
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	All therapists and researchers were blinded to patient allocation except the study co-ordinator. The patients were also blinded to their intervention group
Blinding of outcome assessment (detection bias) Subjective outcome measures	Unclear risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	All therapists and researchers were blinded to patient allocation except the study co-ordinator. The patients were also blinded to their intervention group
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	There were no subjective outcome measures
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants were analysed after the intervention
Selective reporting (reporting bias)	Unclear risk	The reported outcomes differed from the protocol of the study (NCT01945515)

Shaheiwola 2018

Study characteristics

Methods	Study design: RCT Number of dropouts: none Number of adverse effects: none reported

Shaheiwola 2018 *(Continued)*

	Deaths: none ITT: all patients were assessed as intended to treat
Participants	Country: China Sample size: 30 (15 in experimental and 15 in control group) Inclusion criteria: (1) age between 35 and 70 years; (2) cerebral haemorrhage or cerebral infraction for the first time; (3) confirmed by head CT or MRI; (4) at least 6 months since stroke onset and an ipsilateral arm Brunnstrom recovery at stages 0–3; (5) conscious and able to communicate; and (6) able to sign informed consent himself/herself or with the help of his/her immediate family member. Exclusion criteria: (1) sequelae after lacunar cerebral infraction; (2) peripheral neuropathy in upper limbs; (3) unconsciousness, sensory aphasia or mental disorders, that may lead to failures in co-ordinating examination and treatment; (4) history of seizure. (5) serious illnesses, such as heart, liver or kidney diseases, or serious coagulation disorders; (6) history of cognitive disorder, neuropsychiatric disorder, drug or alcohol abuse; (7) organ failure, carcinoma or terminal stroke that seriously affect quality of life beyond hand dysfunction; (8) inability to complete basic course, to persist treatment, or difficult to follow-up; (9) with metal implants or skull defect; (10) existence of skin rash, allergy or wounds at the locations where stimulation electrodes would be placed.
Interventions	2 arms: 1. Group A (A-tDCS + FES) (N = 15) 2. Group B (S-tDCS + FES) (N = 15)
Outcomes	Outcomes were measured before and after intervention after 4 weeks 1. FMA 2. WMFT 3. MAS 4. surface EMG 5. TMS to measure the corticomotor excitability of the lesioned primary motor cortex (M1)
Funding source	This work was supported by the National Natural Science Foundation of China (No. 51475292, No. 61761166006), and the Shanghai Municipal Commission of Health and Family Planning (No. 2017ZZ01006)
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Random sequence generation not stated
Allocation concealment (selection bias)	Unclear risk	concealment allocation not stated
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	There were no subjective outcome measures
Blinding of participants and personnel (performance bias)	Unclear risk	Blinding of participants and personnel was not stated

Shaheiwola 2018 *(Continued)*

Objective outcome measures		
Blinding of outcome assessment (detection bias) Subjective outcome measures	Unclear risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "A blinded clinical rater assessed the upper limb function of all subjects before and after the baseline observation period"
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	There were no subjective outcome measures
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Low risk	No selective reporting, the study was done according the protocol of the study (Chinese Clinical Trial Registry, registration No.: ChiCTR-ICR-15006108, date: 2015-03-15)

Sik 2015

Study characteristics	
Methods	Study design: RCT Number of dropouts: 5 (2 patients in the anodal tDCS group, 2 in the bihemispheric tDCS group, and 1 in the sham tDCS group) Number of adverse effects: not described Deaths: not described ITT: not described
Participants	Country: Turkey Sample size: 36 (12 in anodal tDCS, 12 in bihemispheric tDCS,and 12 in sham tDCS) Inclusion criteria: history of subacute or chronic stroke (disease duration of at least 3 months) and- hand-wrist dorsiflexion of at least 10 degrees (90 degrees wrist palmar flexion posture) due to involvement of the middle cerebral artery Exclusion criteria: severe cognitive deficits (MMSE score of 10 or lower), history of epileptic
Interventions	3 arms: 1. anodal tDCS 2. bihemispheric tDCS 3. sham tDCS

Sik 2015 *(Continued)*

	(In addition to 3 weeks, for a total of 15 sessions, physiotherapy and occupational therapy) convulsion, severe depression (Beck Depression Inventory score of thirty or higher), neglect syndrome, aphasia, severe spasticity (grade 3-4 MAS), static deformity in the upper extremity, non-ambulated (FAC of one or lower), cerebellar or anterior cerebral artery involvement, brain stem involvement, basal ganglia involvement, intracranial metallic implant, cardiac pacemaker, significant visual loss, significant hearing loss, complex regional pain syndrome in plegic upper extremity, uncontrolled systemic problems, and application of botulinum A toxin to the plegic upper extremity in the past 6 months
Outcomes	Outcomes were measured at baseline and after 15 days 1. JTT 2. WMFT 3. Kocaeli Functional Evaluation Test
Funding source	None reported
Notes	Anodal-cathodal tDCS was performed by the placement of the active electrode to the C3-C4 area of the unaffected hemisphere in addition to its anodal application, and the placement of the reference electrode to the opposite supraorbital region with the reversal of the current against the anodal tDCS. In the sham tDCS group, electrodes were placed as in the anodal group, with the first tingling sensation (1 minute) achieved by turning on the device followed by interruption of the current, performed carefully so that the patient did not notice

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Method of random sequence generation is lacking Quote: "The 36 patients were randomly assigned (basic randomization was used) into three groups"
Allocation concealment (selection bias)	Unclear risk	Method of concealment allocation is not described
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	There were no subjective outcome measures
Blinding of participants and personnel (performance bias) Objective outcome measures	Unclear risk	Blinding of participants and personnel not described
Blinding of outcome assessment (detection bias) Subjective outcome measures	Unclear risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "The evaluation of WMFT and KFET was conducted by an experienced physiotherapist who was blinded to the therapy"
Incomplete outcome data (attrition bias)	Unclear risk	There were no subjective outcome measures

Sik 2015 *(Continued)*

Subjective outcome measures		
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	There are differences between the number of patients included and presented at different parts of the results of the study
Selective reporting (reporting bias)	Unclear risk	No published study protocol was found

Sohn 2013

Study characteristics	
Methods	Study design: randomised sham-controlled cross-over trial Number of dropouts: not stated Number of adverse effects: not stated Deaths: not stated ITT: unclear
Participants	Country: Republic of Korea Sample size: 11 (age in years (mean (SD)): 58 (15); time since stroke in days (mean (SD)): 63 (17)) Inclusion criteria: not explicitly stated, undergoing rehabilitation following acute treatment Exclusion criteria: history of previous stroke; history of previous epilepsy/seizure; family history of epilepsy/seizure; metal in the cranial cavity; permanent pacemaker; previous or persistent other neurological disorders; stroke lesion in the cerebellum; contracture of the lower limb on the affected side
Interventions	Each participant underwent 1 of the following 2 conditions: 1. A-tDCS over M1 of the affected hemisphere (2 mA for 10 minutes) followed by 48 hours of resting period followed by sham tDCS over M1 of the affected hemisphere (2 mA for 20 seconds) 2. sham tDCS over M1 of the affected hemisphere (2 mA for 20 seconds) followed by 48 hours of resting period followed by A-tDCS over M1 of the affected hemisphere (2 mA for 10 minutes)
Outcomes	Outcomes were measured at baseline and at study end: 1. balance performance (Balance System SD) 2. isometric strength of knee extensor muscles (Biodex System 4 Pro)
Funding source	None reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "The two stimulation experiments were performed in random order for each patient"

Sohn 2013 *(Continued)*

Allocation concealment (selection bias)	Unclear risk	Not described by the study authors
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of participants and personnel (performance bias) Objective outcome measures	Unclear risk	Participants were blinded Quote: "Patients were unlikely to be aware of any difference between real and sham stimulation", whereas personnel were probably not; quote: "Second, a double-blind design was not used for experiments"
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Outcome assessor probably was not blinded, however the review authors judged that the outcome measurement is not likely to be influenced by lack of blinding Quote: "Second, a double-blind design was not used for experiments"
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcomes listed in the methods section reported

Straudi 2016

Study characteristics	
Methods	Study design: RCT Number of dropouts: none Number of adverse effects: 10 out of 23 patients reported mild side effects after stimulation (7 in the real-tDCS group and 3 in the sham-tDCS group): skin redness under the site of stimulation (6:5 in the real-tDCS group, 1 in sham-tDCS group), headache (2:1 in real-tDCS group and 1 in sham-tDCS group), sleepiness (1 in real-tDCS group), and neck pain (1 in sham-tDCS group). Deaths: none ITT: all patients were evaluated after treatment
Participants	Country: Italy

Straudi 2016 *(Continued)*

	Sample size: 23 (12 in real-tDCS + robot-assisted arm training and 11 in sham-tDCS + robot-assisted arm training) Inclusion criteria: none reported Exclusion criteria: none reported
Interventions	2 arms: 1. dual-tDCS + robot-assisted arm training 2. sham-tDCS + robot-assisted arm training
Outcomes	Outcomes were measured at baseline and after 10 sessions (5 sessions/week) after 2 weeks Primary outcome measure: FMA- Upper Limb Secondary outcomes: BBT, MAL
Funding source	Carlotta Martinuzzi and Claudia Pavarelli were supported by Emilia Romagna region (Grant 1786/2012)
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Patients enrolled were randomized in blocks of 4, stratified by the time distance from stroke (subacute: <6 months; chronic phase: >6 months), using a program available online (http://www.randomization.com/)."
Allocation concealment (selection bias)	Unclear risk	Quote: "They were allocated into two different treatment groups [...]"
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Participants were blinded. Blinding of personnel not stated
Blinding of participants and personnel (performance bias) Objective outcome measures	Unclear risk	Participants were blinded. Blinding of personnel not stated
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "Outcome measures were assessed the week before treatment initiation (T0) and the week after the end of treatment (T1) by a researcher blinded to the treatment received."
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "Outcome measures were assessed the week before treatment initiation (T0) and the week after the end of treatment (T1) by a researcher blinded to the treatment received."
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated

Straudi 2016 *(Continued)*

Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	There is a published protocol (NCT01828398). All outcome measures listed in the protocol have been listed except the Ashworth Modified Scale. The tDCS side effect questionnaire has not been listed in protocol

Sunwoo 2013a

Study characteristics	
Methods	Study design: randomised controlled cross-over trial Number of dropouts: not stated Number of adverse effects: 3 (mild headache after real dual-tDCS) Deaths: not stated ITT: unclear
Participants	Country: Republic of Korea Sample size: 10 chronic stroke patients (mean age 63 years) with left unilateral visuospatial neglect after stroke Inclusion criteria: not explicitly stated except written informed consent Exclusion criteria: metallic implants in the head; skull defect; history of seizure; uncontrolled medical problems; severe cognitive impairment
Interventions	Each participant underwent all of the following conditions (separated by a resting period of at least 24 hours) 1. A-tDCS over the right PPC (1 mA for 20 minutes) plus C-tDCS over the left PPC (1 mA for 20 minutes) 2. A-tDCS over the right PPC (1 mA for 20 minutes) plus sham tDCS over the left PPC (1 mA for 10 seconds) 3. Sham tDCS over the right PPC (1 mA for 10 seconds) plus sham tDCS over the left PPC (1 mA for 10 seconds)
Outcomes	Outcomes were measured at baseline and at the end of stimulation 1. Line bisection test 2. Star cancellation test
Funding source	This study was supported by the National Research Foundation of Korea (Grant No. 2011-0016960), by the Samsung Medical CenterClinical Research Development Program (#CRDP CRS-110-05-1), and by a KOSEF grant (M10644000022-06N4400-02210) funded by the Korean Government
Notes	

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**

Sunwoo 2013a *(Continued)*

Random sequence generation (selection bias)	Unclear risk	Quote: "All patients participated in dual, single, and sham tDCSsessions at intervals of at least 24 hours between sessions in a randomized order"
Allocation concealment (selection bias)	Unclear risk	Not described by the study authors
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	Participants were blinded, whereas blinding of personnel was not stated. However, the review authors judge that the outcome measurement is not likely to be influenced by lack of blinding
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants were blinded, whereas blinding of personnel was not stated. However, the review authors judge that the outcome measurement is not likely to be influenced by lack of blinding
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Outcome assessor was blinded Quote: "Both tests were performed by a single examiner who was blinded to the type of stimulation"
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Outcome assessor was blinded Quote: "Both tests were performed by a single examiner who was blinded to the type of stimulation"
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcome measures listed in the methods section have been reported

Tahtis 2012

Study characteristics	
Methods	Study design: RCT Number of dropouts: not stated Number of adverse effects: none Deaths: not stated ITT: unclear
Participants	Country: not stated

Tahtis 2012 *(Continued)*

	14 subacute stroke patients (2 to 8 weeks after stroke) Inclusion criteria: mobile stroke survivors with focal, ischaemic stroke; walking difficulties after stroke (self reported) Exclusion criteria: previous neurological conditions, seizure; musculoskeletal insult; pacemaker
Interventions	2 arms 1. Dual-tDCS with the anode placed over M1 of the lesioned hemisphere and the cathode placed over M1 of the non-lesioned hemisphere (2 mA for 15 minutes) 2. Sham tDCS with the anode placed over M1 of the lesioned hemisphere and the cathode placed over M1 of the non-lesioned hemisphere (2 mA for < 30 seconds)
Outcomes	Outcomes were measured at baseline and at study end 1. Performance Oriented Mobility Assessment 2. TUG 3. Tinnetti Balance and Gait Index
Funding source	None reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "Subjects were randomised to either the treatment group or to placebo"
Allocation concealment (selection bias)	Unclear risk	Not described by the study authors
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Participants were blinded, whereas blinding of personnel was not stated
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants were blinded, whereas blinding of personnel was not stated
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Outcome assessors were blinded; quote: "Two independent assessors blindly assessed the POMA" and "Three consecutive recordings of the TUG were taken by the same blinded assessor"
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Outcome assessors were blinded; quote: "Two independent assessors blindly assessed the POMA" and "Three consecutive recordings of the TUG were taken by the same blinded assessor"
Incomplete outcome data (attrition bias)	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated

Tahtis 2012 *(Continued)*

Subjective outcome measures		
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcomes reported in the methods section reported

Tedesco Triccas 2015b

Study characteristics	
Methods	Study design: RCT Number of dropouts: 1 in the A-tDCS group (skin reaction due to tDCS) Number of adverse effects: 1 in the A-tDCS group (skin reaction due to tDCS) Deaths: none ITT: no
Participants	Country: UK Sample size: 22 participants Inclusion criteria: aged 18 and above; clinical diagnosis of first-ever stroke, confirmed by a neurologist/stroke specialist; time since stroke > 2 weeks prior to enrolment; upper and fore-arm and hand paresis (MRC > 2); minimal spasticity (MAS ≤ 2); partial shoulder flexion with gravity; good sitting balance; informed consent Exclusion criteria: MMSE < 24; other neurological conditions; shoulder pain resulting from shoulder flexion > 90°; epilepsy; metal implants in the skull or brain; previous brain neurosurgery; medications that influence cortical excitability; previous adverse effects when stimulated with tDCS; pregnancy
Interventions	2 arms 1. A-tDCS over M1 of the affected hemisphere (1 mA for 20 minutes) during the first 20 minutes of a 60 minute robotic training session with the ArmeoSpring device for 18 sessions during 8 weeks (approximately 2 to 3 sessions per week) 2. sham tDCS over M1 of the affected hemisphere (1 mA for 20 minutes) during the first 20 minutes of a 60 minute robotic training session with the ArmeoSpring device for 18 sessions during 8 weeks (approximately 2 to 3 sessions per week)
Outcomes	Outcomes were measured at baseline and at the end of intervention and at 3 months follow-up Primary outcome: 1. UE-FM Secondary outcomes: 1. ARAT 2. MAL 3. SIS 3.0

Tedesco Triccas 2015b *(Continued)*

Funding source	Funded by Wessex Medical Research, University of Southampton and Strategic Educational Pathways Scholarships
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Block randomisation was used with a computer program called 'random allocation software'"
Allocation concealment (selection bias)	Low risk	Quote: "To conceal allocation, an independent person placed the printed papers of sham/real in sealed opaque envelopes according to block randomisation. As soon as a participant enrolled in the study, the researcher made a telephone call to the independent person who then stated whether 'real' or 'sham' was to be administered to the participant"
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Participants apparently were blinded, but blinding of personnel not stated
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants apparently were blinded, but blinding of personnel not stated
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "Three blinded assessors, trained qualified physiotherapists with experience in stroke assessment and neurological rehabilitation carried out clinical assessments. In addition to the clinical assessor, video recorded FMA and ARAT assessments were also scored by an additional blinded clinical assessor"
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "Three blinded assessors, trained qualified physiotherapists with experience in stroke assessment and neurological rehabilitation carried out clinical assessments. In addition to the clinical assessor, video recorded FMA and ARAT assessments were also scored by an additional blinded clinical assessor"
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	1 participant in the A-tDCS group dropped out (1 out of 23; 4%) because of a skin reaction due to tDCS, whereas in the sham group there were no dropouts Quote: "After four intervention sessions, a participant with chronic stroke dropped out of the trial due to a skin reaction after receiving four real tDCS sessions"
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	1 participant in the A-tDCS group dropped out (1 out of 23; 4 %) because of a skin reaction due to tDCS, whereas in the sham group there were no dropouts Quote: "After four intervention sessions, a participant with chronic stroke dropped out of the trial due to a skin reaction after receiving four real tDCS sessions"
Selective reporting (reporting bias)	Unclear risk	All outcome measures listed in the methods section have been reported. All outcome measures from the published study protocol have been reported, except measures of cortical excitability

Utarapichat 2018

Study characteristics	
Methods	Study design: randomised controlled crossover trial Number of dropouts: none Number of adverse effects: none described Deaths: none ITT: all patients were analysed after receiving the intervention
Participants	Country: Thailand Sample size: 10 (5 in experimental and 5 in control group) Inclusion criteria: first hemiparesis caused by an ischaemic stroke, onset longer than 6 months, age at onset older than 18 years, normal consciousness, stable neurological status, muscle power of the knee extensor and ankle dorsiflexor of paretic limb were grade 2 to 4 (MRC), and stage 4 to 6 of Brunnstrom recovery stage of the lower limb Exclusion criteria: seizure, fixed contracture of knee or ankle joint, MAS score of 2 or greater of the knee or ankle, the Thai Mental Status Examination score lower than 23, currently using sodium- or calcium-channels blockers and N-methyl D-aspartate eceptor antagonist, and have a contraindication for electrical stimulation
Interventions	2 arms: 1. anodal tDCS (2 mA, 10 minutes) 2. sham stimulation (2 mA, 30 seconds)
Outcomes	Outcomes were measured at baseline and immediately after stimulation: 1. Root mean square amplitude and median frequency of the vastus medialis oblique and tibialis anterior muscles of the paretic limb 2. TUG
Funding source	None reported
Notes	

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Quote:' The sequence of stimulation was randomly assigned by a computerized generated randomization program'
Allocation concealment (selection bias)	Unclear risk	Allocation concealment not described
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	There were no subjective outcome measures
Blinding of participants and personnel (performance bias)	Low risk	Study authors state that the outcomes were patient-blinded

Utarapichat 2018 *(Continued)*

Objective outcome measures		
Blinding of outcome assessment (detection bias) Subjective outcome measures	Unclear risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias) Objective outcome measures	High risk	No assessor was blinded
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	There were no subjective outcome measures
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	No protocol for the study found

Viana 2014

Study characteristics	
Methods	Study design: RCT Number of dropouts: none Number of adverse effects: none Deaths: none ITT: yes
Participants	Country: Brazil Sample size: 20 participants Inclusion criteria: unilateral stroke within 6 months prior to enrolment; age above 21 years; residual weakness/spasticity of the affected upper limb; being able to hold a Nintendo Wii controller with paretic hand; no cognitive deficits as measured by MMSE; being able to follow instructions and interact with the games; informed consent Exclusion criteria: history of seizure; cerebral aneurysm; prior surgery involving metallic implants
Interventions	2 arms: 1. A- tDCS over M1 of the affected hemisphere (2 mA for 13 minutes) plus virtual reality training using Nintendo Wii for 60 minutes 3 days a week for 5 weeks 2. S- tDCS over M1 of the affected hemisphere (2 mA for 30 seconds) plus virtual reality training using Nintendo Wii for 60 minutes 3 days a week for 5 weeks
Outcomes	Outcomes were measured at baseline and at the end of intervention and at 5-week follow-up:

Viana 2014 *(Continued)*

	Primary outcomes 1. UE-FM 2. WMFT Secondary outcomes 1. MAS 2. hand-held dynamometry
Funding source	This research was supported by the Brazilian National Counsel of Technological and Scientific Development (CNPQ), and Coordination for the improvement of higher Education Personnel (CAPES)
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Participants were randomly assigned to the experimental or control groups by using sealed opaque envelopes"
Allocation concealment (selection bias)	Low risk	Quote: "Participants were randomly assigned to the experimental or control groups by using sealed opaque envelopes"
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Quote: "The participants and the researchers involved in the VRT interventions and evaluations were blind to group allocations for the duration of the trial"
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "The participants and the researchers involved in the VRT interventions and evaluations were blind to group allocations for the duration of the trial"
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcomes listed in the methods section reported

Wang 2014

Study characteristics	
Methods	Study design: RCT Number of dropouts: not stated Number of adverse effects: 3 (mild tingling) Deaths: none ITT: unclear
Participants	Country: USA Sample size: 9 participants Inclusion criteria: aged between 18 and 90 years; first time clinical ischaemic or haemorrhagic stroke, radiologically confirmed; > 20° wrist extension and > 10° finger extension (all fingers); time since stroke more than 1 month prior to study enrolment Exclusion criteria: significant prestroke disability; advanced or terminal disease; substantial decrease in alertness, language reception or attention interfering with understanding instructions; contraindications to TMS; history of alcohol/drug abuse; participation in another study targeting stroke recovery; use of neuropsychotropic drugs (monoamine oxidase-inhibitors); epilepsy; marked agitation/anxiety; having already received MP or tDCS treatment; pregnancy
Interventions	3 arms: 1. real tDCS plus placebo MP: A-tDCS with the anode placed over M1 of the affected hemisphere (1 mA for 20 minutes) and the cathode placed over contralateral M1 plus placebo MP 1 hour prior to stimulation once 2. sham tDCS plus MP: sham tDCS with the anode placed over M1 of the affected hemisphere (1 mA for 10 seconds) and the cathode placed over contralateral M1 plus 20 mg of MP 1 hour prior to stimulation once 3. real tDCS plus MP: A-tDCS with the anode placed over M1 of the affected hemisphere (1 mA for 20 minutes) and the cathode placed over contralateral M1 plus 0 mg of MP 1 hour prior to stimulation once
Outcomes	Outcomes were measured at baseline, immediately after the intervention and 30 minutes after the end of intervention: 1. TMS (cortical excitability) 2. PPT (hand function)
Funding source	QM Wang was supported by NIHK08 (HD074668)
Notes	

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Quote: "Subjects were randomly assigned to 1 of 3 groups"
Allocation concealment (selection bias)	Unclear risk	Not described by the study authors

Wang 2014 *(Continued)*

Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Participants were blinded; blinding of personnel not described, however the review authors judge that the outcome measurement is not likely to be influenced by lack of blinding
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "A blinded rater measured safety, hand function, and cortical excitability before and after treatment"
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	There were no subjective outcome measures
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	All participants apparently completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Unclear risk	All outcomes listed in the methods section reported

Wong 2015

Study characteristics	
Methods	Study design: RCT Number of dropouts: not described Number of adverse effects: not described Deaths: unclear ITT: unclear
Participants	Country: Hong Kong Sample size: 17 (10 in experimental and 7 in control group) Inclusion criteria: patients after stroke with mild wrist and fingers control of Oxford Scale Grade 2 or above Exclusion criteria: not described

Wong 2015 *(Continued)*

Interventions	2 arms: 1. anodal stimulation by tDCS to the hand area of primary motor cortex of the affected hemisphere, while cathodal electrode was placed over the contralateral supraorbital area (1 mA tDCS for 20 minutes) together with intensive physiotherapy upper limb training 2. intensive physiotherapy upper limb training without tDCS
Outcomes	Outcomes were measured at Ti and after 5 consecutive sessions of tDCS together with intensive physiotherapy upper limb training 1. FMA- Upper limb
Funding source	None reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Random sequence generation not described
Allocation concealment (selection bias)	Unclear risk	Allocation concealment not described
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	Blinding was not described
Blinding of participants and personnel (performance bias) Objective outcome measures	Unclear risk	Blinding was not described
Blinding of outcome assessment (detection bias) Subjective outcome measures	Unclear risk	No subjective outcome measures described
Blinding of outcome assessment (detection bias) Objective outcome measures	Unclear risk	Blinding was not described
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	No subjective outcome measures described
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	Unclear if all participants completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated

Wong 2015 *(Continued)*

Selective reporting (reporting bias)	Unclear risk	Unclear if all outcomes are reported

Wu 2013a

Study characteristics	
Methods	Study design: RCT with parallel-group design Dropouts: none Adverse effects: none Deaths: none ITT: yes Duration: 1 month
Participants	Country: China Number of participants: 90 Age: mean (SD) C-tDCS: 45.9 (11.2), sham tDCS 49.3 (12.6) years Gender: C-tDCS: 34 (76%) men, sham tDCS: 35 (78%) men Type of stroke: C-tDCS: 27 (60%) ischaemic, sham tDCS: 26 (58%) ischaemic Time poststroke in months: mean (SD) C-tDCS: 4.9 (3.0); sham tDCS 4.9 (2.9) Severity: FMA for C-tDCS: 12 (4 to 26) and 8 (3 to 34), BI for C-tDCS 55 (0 to 85) and 55 (25 to 95) for sham tDCS Inclusion criteria: time since stroke > 2 months, first-ever stroke, muscle tone at wrist and elbow with MAS score ≥ 1 and ≤ 3, no history of Botox or other invasive treatment in the previous 6 months, use of spasmolytics resulting in an adverse event or maximised dosing without effect and no severe cognitive or mood disorders Exclusion criteria: unstable vital signs or unstable, progressive or severe neurological disease, heart condition or hypertension
Interventions	2 arms: 1. physical therapy twice daily for 30 minutes each, C-tDCS over M1 lesioned (1.2 mA for 20 minutes once daily, 5 days per week for 4 weeks) 2. physical therapy twice daily for 30 minutes each, sham tDCS over M1 lesioned (1.2 mA for 30 seconds once daily, 5 days per week for 4 weeks)
Outcomes	Outcomes used: MAS (range from 0 to 4, with a score of 4 reflecting the highest possible muscle tone), UE-FM (0 to 66, with higher scores reflecting better motor performance) and MBI (0 to 105, with higher scores reflecting better ADL performance) Time points of measurement: at baseline, at the end of the intervention period and at 4-week follow-up
Funding source	Supported by the National Natural Science Foundation of China (grant nos. 30600186 and 81171011)
Notes	

Wu 2013a *(Continued)*

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Subjects were randomly assigned using a computer-generated randomisation list by a single investigator"
Allocation concealment (selection bias)	Low risk	Quote: "The assigned random number was inputted into the stimulator device by the same investigator. She did not participate in other parts of the study. The device automatically generated active or sham tDCS according to the parity of the random number"
Blinding of participants and personnel (performance bias) Subjective outcome measures	Low risk	Quote: "All other investigators, subjects, and outcome assessors remained blinded to group allocation until the completion of the final statistical analyses"
Blinding of participants and personnel (performance bias) Objective outcome measures	Low risk	Quote: "All other investigators, subjects, and outcome assessors remained blinded to group allocation until the completion of the final statistical analyses"
Blinding of outcome assessment (detection bias) Subjective outcome measures	Low risk	Quote: "All other investigators, subjects, and outcome assessors remained blinded to group allocation until the completion of the final statistical analyses"
Blinding of outcome assessment (detection bias) Objective outcome measures	Low risk	Quote: "All other investigators, subjects, and outcome assessors remained blinded to group allocation until the completion of the final statistical analyses"
Incomplete outcome data (attrition bias) Subjective outcome measures	Low risk	All participants completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Incomplete outcome data (attrition bias) Objective outcome measures	Low risk	All participants completed the study. No treatment withdrawals, no losses to follow-up, no trial group changes and no major adverse events were stated
Selective reporting (reporting bias)	Low risk	All outcomes from the methods section and from the published trial protocol were reported

Yi 2016

Study characteristics

Methods	Study design: RCT Number of dropouts: 2 out of 32 Number of adverse effects: none described

Yi 2016 *(Continued)*

	Deaths: none described ITT: unclear (Initially 32 patients included and 30 patients analysed)
Participants	Country: Korea Sample size: 30 (study started with 32) (10 in first experimental, 10 in second experimental and 10 in control group) Inclusion criteria: 1) first ever stroke, 2) left visuospatial neglect, defined as > 6.33 mm average deviation from the center line on the line bisection test (LBT) [11], and 3) diagnosed as right cerebral ischaemic or haemorrhagic stroke Exclusion criteria: 1) severe cognitive dysfunction or aphasia, 2) contraindications for tDCS, such as history of previous seizure, major head trauma, previous brain operation, a metal implant in the brain, or a pacemaker, or 3) systemic disease or ongoing neoplasia
Interventions	3 arms: 1. anodal tDCS over the right posterior parietal cortex 2. cathodal tDCS over the left posterior parietal cortex 3. or sham tDCS Each patient underwent 15 sessions of tDCS (5 sessions per week for 3 weeks; 2 mA for 30 minutes in each session)
Outcomes	Outcomes were measured before treatment and 3 weeks after completing the treatment: 1. motor-free visual perception test, 2. line bisection test, 3. star cancellation test, 4. Catherine Bergego Scale, 5. Korean version of Modified Barthel Index (K-MBI), and 6. FAC
Funding source	None reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "by a number assigned by a centralized computer-generated randomization code"
Allocation concealment (selection bias)	Unclear risk	Concealment of allocation not described
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	There were no subjective outcome measures
Blinding of participants and personnel (performance bias)	Low risk	Quote: "all patients were blinded to the type of stimulation they received"

Yi 2016 *(Continued)*

Objective outcome measures		
Blinding of outcome assessment (detection bias) Subjective outcome measures	Unclear risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias) Objective outcome measures	High risk	No blinding of outcome assessors done
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	There were no subjective outcome measures
Incomplete outcome data (attrition bias) Objective outcome measures	Unclear risk	Not all of the 32 included participants completed the study (n = 30). Analyses of losses to follow-up are not stated
Selective reporting (reporting bias)	Unclear risk	No study protocol for this trial found (no trial registration)

Yun 2015

Study characteristics	
Methods	Study design: RCT Number of dropouts: not described Number of adverse effects: not described Deaths: none described ITT: not described
Participants	Country: Korea Sample size: 45 (15 in first experimental, 15 second experimental and 15 in control group) Inclusion criteria: within 6 months from their stroke, no damage of the temporal lobe on magnetic resonance imaging Exclusion criteria: apraxia, aphasia, and neglect, history of craniectomy or seizure.
Interventions	3 arms: 1. A-tDCS over the left fronto-temporal anode stimulation (left-FTAS) group 2. A-tDCS over the right fronto-temporal anode stimulation (right-FTAS) group, and 3. S-tDCS Patients in each group received tDCS treatment for 30 minutes, 5 times a week for 3 weeks
Outcomes	Outcomes were measured at baseline and after 3 weeks:

Yun 2015 *(Continued)*

1. Computerized Neuropsychological Test
2. Korean Mini-Mental State Examination
3. Korean version of the Modified Barthel Index

Funding source	None reported
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No description of random sequence generation
Allocation concealment (selection bias)	Unclear risk	No description of concealment of allocation
Blinding of participants and personnel (performance bias) Subjective outcome measures	Unclear risk	There were no subjective outcome measures
Blinding of participants and personnel (performance bias) Objective outcome measures	Unclear risk	No blinding described
Blinding of outcome assessment (detection bias) Subjective outcome measures	Unclear risk	There were no subjective outcome measures
Blinding of outcome assessment (detection bias) Objective outcome measures	Unclear risk	No blinding described
Incomplete outcome data (attrition bias) Subjective outcome measures	Unclear risk	There were no subjective outcome measures
Incomplete outcome data (attrition bias) Objective outcome measures	High risk	No blinding done
Selective reporting (reporting bias)	Unclear risk	Study is not registered and no study protocol was found

A-tDCS: anodal transcranial direct current stimulation
AMT: active motor threshold
ARAT: Action Research Arm Test
ASS: Ashworth Spasticity Score
AT: arm robotic training

BBS: Berg BalanceScale
BBT: Box and Block Test
BI: Barthel Index
BWSTT: body-weight-supported treadmill training
C-tDCS: cathodal transcranial direct current stimulation
CIMT: constraint-induced movement therapy
DLPFC: Dorsolateral prefrontal cortex
EEG: electroencephalography
ESS: European Stroke Scale
FAC: Functional Ambulation Category
FDI: first dorsal interosseous muscle
FMA: Fugl-Meyer Assessment
FTSST: Five times sit to stand test
iTBS: intermittent theta burst stimulation
ITT: intention-to-treat analysis
JTT: Jebsen Taylor Hand Function Test
LTP: Long-term potentiation
M1: primary motor cortex
mA: milliampere
MAL: Motor Activity Log Rating Scale
MAS: Modified Ashworth Scale
MBI: Modified Barthel Index
MCA: middle cerebral artery
MEP: motor-evoked response
MI: Motricity Index
MI-BCI: motor imagery brain-computer interface
MIT: Massachusetts Institute of Technology
MMSE: Mini Mental State Examination
MP: methylphenidate
MRC: Medical Research Council
MRI: magnetic resonance imaging
NHPT: Nine Hole Peg Test
NIHSS: National Institute of Health Stroke Scale
NMDA: *N*-methyl-D-aspartate
NRS: Numerical Rating Scale
OMCASS: Orgogozo MCA scale
PMC: premotor cortex
PPC: posterior parietal cortex
PPT: Purdue Pegboard Test
RCT: randomised controlled trial
ROM: range of motion
RMI: Rivermead Mobility Index
RMT: resting motor threshold
rPNS: repetitive peripheral nerve stimulation
SD: standard deviation
SIS: Stroke Impact Scale
tDCS: transcranial direct current stimulation
TMS: transcranial magnetic stimulation\tsDCS: transcutaneous spinal direct current stimulation
TUG: Timed Up and Go Test
UE-FM: Upper Extremity Fugl-Meyer Score
WMFT: Wolf Motor Function Test

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Alves 2017	Irrelevant outcome for review question
Asseldonk 2016	Irrelevant outcome for review question

Study	Reason for exclusion
Boggio 2007b	Not a true RCT
Bradnam 2012	Not a true RCT
Byblow 2011	Not a true RCT; irrelevant outcome: motor-evoked potential
Celnik 2009	Outcome "number of correct key presses" not clinically relevant
Cho 2015	Irrelevant comparison for review question: all patients received tDCS
CTRI/2018/04/013380 2018	Irrelevant outcome measure
Del Felice 2016	Irrelevant intervention: compared 2 different types of tDCS
Edwards 2009	Not a true RCT
Fujimoto 2015	Irrelevant outcome for review question
Gandiga 2006	Not a true RCT
Giacobbe 2013	Irrelevant outcome measure: movement kinematics
Goh 2015	Irrelevant outcome: motor-evoked potential
Goodwill 2015	Irrelevant outcome for review question
Gurchin 1988	Irrelevant intervention: transcranial alternating current stimulation
Hummel 2005a	Not a true RCT
Hummel 2005b	Not a true RCT
Jayaram 2009	Irrelevant outcome for review question: "motor-evoked potentials"
Kasashima 2012	Irrelevant outcome for review question: "event-related desynchronisation"
Kharchenko 2001	Irrelevant Intervention for review question: "transcranial alternating current stimulation"
Kim 2014	Irrelevant outcome for review question
Kitisomprayoonkul 2012	Irrelevant outcome for review question: "sensation"
Koh 2017	Irrelevant Intervention: sham tDCS was contaminatied with sham anaesthesia
Krewer 2013	Irrelevant intervention: galvanic vestibular stimulation
Kumar 2011	Irrelevant intervention for review question: study did not evaluate impact of tDCS on upper limb/ lower limb function and/or ADL
Kwon 2012	Not a true RCT
Kwon 2016	Irrelevant outcome for review question
Lee 2012	Irrelevant patients for review question

Study	Reason for exclusion
Lee 2015	Irrelevant outcome for review question
Lee 2018	Irrelevant outcome for review question
Lefebvre 2013	Not a true randomised controlled cross-over trial
Lefebvre 2015	Not a true randomised controlled cross-over trial
Leon 2017	Not a true RCT
Madhavan 2011	Irrelevant outcome for review question: "accuracy index"
Manganotti 2011	Not a true RCT
Montenegro 2016	Irrelevant outcome for review question
NCT03486769	Irrelevant comparison for review question. All groups received tDCS
Ochi 2013	Irrelevant comparison for review question: A-tDCS versus C-tDCS with no control group
Paquette 2011	Irrelevant intervention for review question: tDCS was contaminated with rTMS at each stimulation session
Picazio 2015	Not a true RCT
Sheliakin 2006	Not a true RCT
Stagg 2012a	Irrelevant outcome for review question: "response time"
Takebayashi 2017	Irrelevant comparison for review question. All groups received tDCS
Takeuchi 2012	Irrelevant outcome for review question: "bimanual co-ordination," as measured by tapping task
Tang 2017	Irrelevant outcome for review question
Vandermeeren 2015	Irrelevant outcome for review question
Yao 2015	Irrelevant outcome for review question
Zimerman 2012	Not a true randomised controlled cross-over trial

A-tDCS: anodal transcranial direct current stimulation
ADL: activities of daily living
C-tDCS: cathodal transcranial direct current stimulation
RCT: randomised controlled trial
rTMS: repetitive transcranial magnetic stimulation
tDCS: transcranial direct current stimulation

Characteristics of studies awaiting classification *[ordered by study ID]*

Aze 2016

Methods	Study design: randomised cross-over study Number of dropouts: not stated

Aze 2016 *(Continued)*

	Number of adverse effects: not described Deaths: not described ITT: unclear
Participants	Country: France Sample size: 18 (18 in experimental and 18 in control group) Inclusion criteria: stroke > 6 months prior and no recurrence, being able to walk > 10 metres and to turn around while working Exclusion criteria: metallic forein bodies in the brain, active medical devices, pregnancy, uncontrolled epileptic seizures, incapacitating comorbidities
Interventions	Each participant underwent the following conditions: 1. A-tDCS (2 mA for 20 minutes) over M1 of the lesioned hemisphere 2. sham tDCS (2 mA for 30 seconds) over M1 of the lesioned hemisphere
Outcomes	Outcomes were measured at baseline and at follow-up: 1. walking velocity (5-metre walk test) 2. walking capacity (6-minute walk test)
Notes	

Brem 2010

Methods	Not clearly stated by the study authors
Participants	3 right-handed participants with acute stroke (< 5 weeks)
Interventions	A-tDCS at 1 mA for 20 minutes twice a day on 5 consecutive days
Outcomes	UE-FM, NHPT
Notes	Conference abstract only

Miller 2013

Methods	Randomised sham-controlled cross-over trial
Participants	20 chronic stroke patients with residual upper limb motor deficits
Interventions	Each participant underwent either A-tDCS, C-tDCS or sham tDCS separated by a 2-week resting period
Outcomes	Outcomes were assessed at baseline and after every treatment session: 1. JTT (arm and hand function) 2. hand-held dynamometer (grip strength, pinch force)
Notes	Conference abstract only

Park 2014

Methods	Randomised sham-controlled cross-over study
Participants	17 chronic stroke patients (5 (29%) female; mean age 59 years; 12 (71%) had ischaemic stroke)
Interventions	Each participant underwent all of the following conditions: 1. C-tDCS over M1 of the unaffected hemisphere (dosage not described) plus 10 Hz rTMS over M1 of the affected hemisphere 2. A-tDCS over M1 of the unaffected hemisphere (dosage not described) plus 10 Hz rTMS over M1 of the affected hemisphere 3. sham tDCS over M1 of the unaffected hemisphere (dosage not described) plus 10 Hz rTMS over M1 of the affected hemisphere
Outcomes	Outcome measures: 1. change of MEP amplitude (cortical excitability) 2. sequential motor task (hand motor function)
Notes	Conference abstract only

A-tDCS: anodal transcranial direct current stimulation
C-tDCS: cathodal transcranial direct current stimulation
Hz: hertz
JTT: Jebsen–Taylor test
M1: primary motor cortex
mA: milliampere
MEP: Motor Evoked Potentials
NHPT: Nine-Hole Peg Test
rTMS: repetitive transcranial magnetic stimulation
UE-FM: Upper Extremity Fugl-Meyer Assessment

Characteristics of ongoing studies *[ordered by study ID]*

ACTRN12613000109707

Study name	A pilot investigation of the effect of cathodal transcranial direct current stimulation (ctDCS) plus standard upper limb rehabilitation to augment motor recovery post acute stroke
Methods	RCT with blinded outcome assessor ITT analysis: yes
Participants	37 to 40 people between 18 and 80 years of age with acute first-ever ischaemic stroke (in the first week) and moderate to severe hemiparesis (UE-FM ≤ 52) with MEPs detectable by TMS, stable blood pressure parameters and MMSE > 24 Exclusion criteria: pre-existing upper limb impairment causing functional limitation, hemiplegic shoulder pain, metallic implants (pacemaker or artificial cochlea), history of seizure or another unstable medical condition, pregnancy, severe language disturbance, English as a second language, severe neglect (score < 44 out of 54 points on the Star Cancellation test), history of depression, alcohol or drug abuse, coexistent neurological or psychiatric disease, current treatment with antidepressants, antipsychotics or benzodiazepines or current treatment with Na^+ or Ca^{2+} Channel blockers or NMDA receptor antagonists
Interventions	10 rehabilitation sessions (30 minutes each) to the affected arm over a period of 2 weeks (i.e. 5 days of treatment, 2 days rest, 5 days of treatment) + 1 of the following interventions:

ACTRN12613000109707 *(Continued)*

	1. Experimental: C-tDCS to the non-lesioned hemisphere 2. Sham comparator: sham tDCS to the non-lesioned hemisphere
Outcomes	All assessments are to be completed at baseline and at 1 day, 2 weeks and 3 months after the end of the intervention Primary outcome measure: UE-FM change scores Secondary outcome measures: MEP as measured by TMS, NIHSS, Tardieu Spasticity Assessment, FIM, PostStroke Depression Scale
Starting date	4 February 2013
Contact information	Jimena Garcia-Vega, jimena.garcia-vega@health.wa.gov.au
Notes	

ACTRN12616000254493

Study name	TOPS: Transcranial direct-current stimulation (tDCS) to optimise participation in stroke rehabilitation – a sham controlled cross over study
Methods	RCT
Participants	Inclusion criteria: all individuals admitted with Bentley Health Service with stroke will be approached to consent to screening for participation in this study. Inclusion criteria: ≥ 60 years, diagnosis of ischaemic stroke, likely to be inpatient for at least 1 month Exclusion criteria: pre-stroke history of fatigue related syndromes, unstable co-morbid medical or psychiatric disease; history of seizures or metallic foreign body implant; concurrent use of NMDA receptor antagonists or calcium channel blockers
Interventions	2 arms: 1. the active group will receive a 30-seconds stimulation followed by 19 minutes of constant current stimulation (1.5 mA) and a 30-second decline to zero current = total 20 minutes 2. the sham (or 'dummy/placebo' group) will receive a brief 30 seconds stimulation, after which the current declines to zero and stays at zero for 19.5 minutes = total 20 minutes
Outcomes	Primary outcome: 1. alertness (visual analogue scale) self-rated by participant and reported during subsequent therapy sessions (therapy staff) and at set times during the day (nursing staff)
Starting date	2016
Contact information	University of Western Australia Office of Research Enterprise M459, 35 Stirling Highway Crawley WA 6009
Notes	

ACTRN12618000443291

Study name	Connectivity of the ipsilesional motor network as a marker of response to anodal transcranial direct current stimulation in people with stroke
Methods	RCT
Participants	Stroke
Interventions	All participants will be provided with a home exercise program using the Graded Repetitive Arm Supplementary Program (GRASP) for 1 hour daily over a 2-week period (14 sessions). Participants randomised to the 'active' arm of the study will also receive tDCS while simultaneously performing the GRASP exercises (for 20 minutes at the start of the 1-hour GRASP program). TDCS involves weak direct current passing between 2 surface electrodes placed on the scalp. In this study, the electrodes will be positioned with the anode over the ipsilesional M1 and cathode over the contralateral supraorbital region. tDSC will be applied at intensity of 1 mA for 20 minutes daily for two weeks (total of 14 sessions) at home. Stimulation will be ramped up from 0 mA to 1 mA over the first 30 seconds and down from 1 mA to 0 mA over the final 30 seconds 2 arms: 1. real tDCS 2. sham tDCS
Outcomes	1. FMA 2. ARAT
Starting date	2018
Contact information	https://www.anzctr.org.au/Trial/Registration/TrialReview.aspx?id=374732
Notes	

ACTRN12618001835235

Study name	Public title: Robot-assisted arm therapy and brain stimulation to enhance recovery after stroke Scientific title: Enhancing recovery of function after stroke – combined use of physical training (robot-assisted arm therapy) with non-invasive brain stimulation
Methods	RCT
Participants	Stroke
Interventions	Each participant will receive 18 sessions of treatment over 6 to 9 weeks (3 days a week for 6 weeks or 2 days a week for 9 weeks depending on patients convenience) supervised one-on-one by a neuro-physiotherapist Each treatment will comprise brain stimulation (real or sham tDCS) for 20 minutes followed by about 1 hour of robotic therapy tDCS is a non-invasive technique that changes the excitability of brain cells by applying a weak direct current (1 to 2 mA) to the brain. The method of applying tDCS involves placing saline-soaked sponge electrodes onto the skin of the scalp. These electrodes are connected to a battery-driven direct current stimulator. tDCS is painless, inexpensive, has no major adverse effects and is easy to apply clinically. tDCS has been shown to improve arm function after stroke, with different montages of electrode placement over the affected and unaffected hemispheres. In this study 2 mA of anodal tDCS will be applied over the affected hemisphere for 20 minutes prior to arm therapy using the robot

ACTRN12618001835235 *(Continued)*

	The MITManus InMotion Shoulder-Elbow Robot will be used to provide shoulder and elbow movement training in the horizontal plane. The affected arm will be placed in an arm support trough and strapped in, with the hand grasped around a cone-shaped handle. This robot-arm is connected to a computer. All participants will perform the same goal-directed activities to improve shoulder and elbow movements in different directions. The robot-arm detects the amount of movement that the participant can perform, and assists when they cannot reach the targets independently. The amount of assistance the robot-arm gives is constantly altered depending on the degree of movement from the participant
Outcomes	1. FMA
Starting date	2018
Contact information	https://www.anzctr.org.au/Trial/Registration/TrialReview.aspx?id=375872
Notes	

ChiCTR1800014900

Study name	The effect of tDCS plus functional electrical stimulation on gait in patientis with stroke: a prospective, randomized controlled trial
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. tDCS + FES 2. sham tDC + FES
Outcomes	1. FMA
Starting date	2018
Contact information	http://www.chictr.org.cn/showproj.aspx?proj=25381
Notes	

ChiCTR1800015881

Study name	Transcranial direct current stimulation for motor recovery of upper limb function after stroke: a multicenter randomized controlled trial
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. tDCS + routine rehabilitation group 2. sham tDCS + routine rehabilitation group
Outcomes	1. MAS

ChiCTR1800015881 *(Continued)*

	2. FMA
Starting date	2018
Contact information	http://www.chictr.org.cn/showproj.aspx?proj=26941
Notes	

ChiCTR1800018925

Study name	Therapeutic effect of transcranial direct current stimulation combined with functional electrical stimulation on lower limbs motor function in patients with stroke
Methods	RCT
Participants	Stroke
Interventions	3 arms: 1. Group A: FES + sham tDCS 2. Group B: FES + tDCS 3. Group C: sham FES + tDCS
Outcomes	1. 3-D gait analysis 2. dynamic balancing function 3. FMA 4. Berg Balance Scale 5. Modified Barthel Index 6. Modified Ashworth Scale
Starting date	2018
Contact information	http://www.chictr.org.cn/showproj.aspx?proj=32028
Notes	

ChiCTR1800019386

Study name	Effects of virtual reality combined with transcranial direct current stimulation on upper limb function in patients with ischemic stroke
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. Group A: tDCS + VR 2. Group B: VR
Outcomes	1. FMA

ChiCTR1800019386 *(Continued)*

	2. ARAT 3. BI
Starting date	2018
Contact information	http://www.chictr.org.cn/showproj.aspx?proj=25490
Notes	

ChiCTR1800020088

Study name	Comparing the effects of transcranial direct current stimulation (tDCS) as prior and concurrent motor priming combined with mirror therapy on the upper limb motor function recovery in chronic stroke patients: a pilot study
Methods	RCT
Participants	Stroke
Interventions	3 arms: 1. concurrent-tDCS group: 30 minutes tDCS applied concurrently with 30 minutes mirror therapy 2. prior-tDCS group: 30 minutes tDCS applied prior to 30 minutes mirror therapy 3. sham-tDCS group: sham-tDCS applied randomly concurrently with or prior to 30 minutes mirror therapy
Outcomes	1. FMA 2. ARAT 3. BBT
Starting date	2018
Contact information	http://www.chictr.org.cn/showproj.aspx?proj=33260
Notes	

ChiCTR-ICR-15006108

Study name	Effects of tDCS combined FES on upper limb function with severe chronic stroke patients
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. tDCS + FES 2. sham tDCS + FES
Outcomes	1. FMA
Starting date	2015

ChiCTR-ICR-15006108 *(Continued)*

Contact information	http://www.chictr.org.cn/showproj.aspx?proj=10578
Notes	

ChiCTR-IOR-15006429

Study name	Effectiveness of transcranial direct current stimulation training in stroke
Methods	RCT
Participants	Stroke
Interventions	Unclear description
Outcomes	1. FMA
Starting date	2015
Contact information	http://www.chictr.org.cn/showproj.aspx?proj=11013
Notes	

ChiCTR-TRC-11001398

Study name	Effect of transcranial direct current stimulation on recovery of upper limb function after stroke
Methods	Randomised controlled pilot trial in parallel-group design Random sequence generation: computer software Blinding: participants, study staff and outcome assessors are blinded
Participants	120 people with first-time ever stroke and upper limb hemiplegia in the first 3 months after stroke, spasticity at the wrist and elbow (MAS ≤ 1) and no history of spasmolytics
Interventions	2 arms: 1. Experimental 1: physical therapy + active tDCS 2. Sham comparator: physical therapy + sham tDCS
Outcomes	1. Brunnstrom stages 2. FMA 3. BI 4. MAS 5. ARAT
Starting date	1 July 2011
Contact information	Dongyu Wu, wudongyu73@yahoo.com.cn
Notes	

ChiCTR-TRC-11001490

Study name	Using transcranial direct current stimulation to treat ataxia and balance impairment after stroke
Methods	Randomised controlled pilot trial in parallel-group design Random sequence generation: computer software Blinding: participants, study staff and outcome assessors are blinded
Participants	40 people with first-time ever stroke and upper limb hemiplegia in the first 3 months after stroke and lesions involving the cerebellum without obvious cerebral oedema Exclusion criteria: unstable vital signs; depression after stroke; severe aphasia; obvious cognition dysfunction (MMSE < 24); serious vision or vision correction anomalies; or history of vertigo attack; hearing impairment or otitis media
Interventions	2 arms: 1. experimental 1: balance and intervention training + active tDCS 2. sham comparator: balance and intervention training + sham tDCS
Outcomes	1. Biodex Balance System 2. International Cooperative Ataxia Rating Scale 3. BBS 4. BI
Starting date	1 August 2011
Contact information	Dongyu Wu, wudongyu73@yahoo.com.cn
Notes	

CTRI/2017/01/007733

Study name	The effect of tDCS plus functional electrical stimulation on gait in patientis with stroke: a prospective, randomized controlled trial
Methods	RCTs
Participants	Stroke
Interventions	2 arms: 1. tDCS and FES 2. sham tDCS and FES
Outcomes	1. FMA
Starting date	2017
Contact information	http://www.chictr.org.cn/showproj.aspx?proj=25381
Notes	

CTRI/2017/05/008668

Study name	Effect of dual-task exercise in conjunction with fluoxetine and transcranial direct current stimulation (tDCS) on postural stability and gait in stroke patients
Methods	RCT
Participants	Stroke Inclusion criteria: 1. first-time ischaemic or haemorrhagic stroke as diagnosed by CT/MRI 2. ischaemic or haemorrhagic stroke between 1 to 6 months from the index event that has caused hemiparesis, as examined and/or confirmed by medical records 3. able to stand with support 4. both genders; age > 18 years and < 75 years 5. Conscious and comprehensible 6. participants need to be able to provide informed consent
Interventions	4 arms: 1. tDCS, fluoxetine, dual task training 2. sham tDCS, fluoxetine, dual task training 3. tDCS, placebo, dual task training 4. sham tDCS, placebo, dual task training
Outcomes	1. Gait Analysis variables 2. FMA-Lower extremity
Starting date	2017
Contact information	vasanthapadma123@gmail.com
Notes	

CTRI/2018/04/013380

Study name	Influence of anodal transcranial direct current stimulation on paretic lower limb muscle activity in stroke survivors
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. anodal-tDCS over the lesioned hemisphere 2. none
Outcomes	Root mean square (amplitude in millivolts) in 4 muscles: rectus femoris, biceps femoris, tibialis anterior, medial gastrocnemius
Starting date	2018

CTRI/2018/04/013380 *(Continued)*

Contact information	pooja8080656215@gmail.com
Notes	

Geiger 2017

Study name	The effect of transcranial direct current stimulation (tDCS) on locomotion and balance in patients with chronic stroke: study protocol for a randomised controlled trial
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. sham and then anodal tDCS 2. anodal tDCS and then sham
Outcomes	Quantify of variability of the center-of-mass movement
Starting date	2014
Contact information	maxime.geiger@gmail.com
Notes	NCT02134158 Impact of tDCS on locomotion and equilibrium in hemiplegic patients (HEMILOCOSTICOR)

IRCT2013121715840N1

Study name	Transcranial direct current stimulation (tDCS) and balance rehabilitation in stroke
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. Experimental group: brain stimulation with anodal tDCS (20 minutes, 2 mA) and balance training for 5 consecutive days 2. Control group: will be offered sham tDCS with 5 consecutive days balance training
Outcomes	1. Postural control 2. Modified Ashworth scale and H-reflex
Starting date	2015
Contact information	http://en.irct.ir/trial/14986
Notes	

JPRN-UMIN000020927

Study name	Examination of constraint-induced movement therapy combining with transcranial direct current stimulation and peripheral neuromuscular electrical stimulation
Methods	RCT
Participants	Stroke
Interventions	tDCS and combination in groups not exactly described
Outcomes	1. FMA 2. MAL
Starting date	2016
Contact information	https://upload.umin.ac.jp/cgi-open-bin/ctr_e/ctr_view.cgi?recptno=R000023979
Notes	

JPRN-UMIN000027980

Study name	Effects of transcranial direct-current stimulation and body-weight-supported treadmill training on gait recovery in hemiparetic patients after stroke
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. anodal tDCS 2. sham tDCS
Outcomes	1. Gait velocity 2. Timed up and go test 3. FMA Lower Extremity 4. Performance Oriented Mobility Assessment Trunk function 5. Trunk Impairment Scale Activities of daily living 6. FIM
Starting date	2017
Contact information	https://upload.umin.ac.jp/cgi-open-bin/ctr_e/ctr_view.cgi?recptno=R000032047
Notes	

JPRN-UMIN000032300

Study name	The effects of transcranial direct current stimulation combined with functional electrical stimulation on gait performance in stroke patients

JPRN-UMIN000032300 *(Continued)*

Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. tDCS with FES 2. sham tDCS with FES
Outcomes	1. 10-meter walking test walking during body sway 2. FMA lower extremity 3. Stroke Impairment Assessment Set 4. Modified Ashworth Scale
Starting date	2018
Contact information	https://upload.umin.ac.jp/cgi-open-bin/ctr_e/ctr_view.cgi?recptno=R000036830
Notes	

JPRN-UMIN000033324

Study name	The effects of gait training during transcranial direct current stimulation on ankle dorsiflexion in patinets with stroke
Methods	RCT
Participants	Stroke
Interventions	3 arms: 1. gait training during tDCS 2. gait training during FES 3. usual rehabilitation program alone
Outcomes	1. 10-meter walking test
Starting date	2018
Contact information	https://upload.umin.ac.jp/cgi-open-bin/ctr_e/ctr_view.cgi?recptno=R000037987
Notes	

JPRN-UMIN000034721

Study name	Efficacy and safety of transcranial direct current stimulation in subacute ischemic stroke
Methods	RCT
Participants	Stroke

JPRN-UMIN000034721 *(Continued)*

Interventions	2 arms: 1. 10 daily sessions of tDCS (n = 10) in 2 weeks 2. 10 daily sessions of sham stimulation (n = 10) in 2 weeks
Outcomes	1. FMA 2. Electroencephalogram
Starting date	2018
Contact information	https://upload.umin.ac.jp/cgi-open-bin/ctr_e/ctr_view.cgi?recptno=R000039587
Notes	

Levin 2018

Study name	Personalized upper limb training combined with anodal-tDCS for sensorimotor recovery in spastic hemiparesis: study protocol for a randomized controlled trial
Methods	
Participants	
Interventions	
Outcomes	
Starting date	
Contact information	
Notes	

NCT00542256

Study name	Effects of transcranial direct current stimulation coupled with constraint-induced movement therapy on motor function in stroke patients
Methods	Double-blind RCT
Participants	50 people 18 to 80 years of age with radiologically confirmed first-time ever ischaemic or haemorrhagic stroke; at least 6 months prior to study enrolment, demonstrating adequate balance with the non-lesioned arm restraint and the ability to stand up from sitting and to stand without help of the upper extremity Exclusion criteria: significant prestroke disability, neuropsychological impairments that hinder motor testing, considerable joint pain in the paretic extremity, life expectancy less than 1 year because of terminal medical diagnosis, advanced disease of viscera, considerable neurological or psychiatric disease, history of substance abuse, use of neuropsychotropic drugs, inability to enrol in another study targeting stroke recovery, prior admittance of CIMT or tDCS
Interventions	2 arms:

NCT00542256 *(Continued)*

	1. Experimental group: 40 minutes of tDCS over M1 at the beginning of 10 of 14 consecutive up to 6 hours lasting CIMT training sessions 2. Control group: 30 seconds of tDCS over M1 at the beginning of 10 of 14 consecutive up to 6 hours lasting CIMT training sessions
Outcomes	Primary outcome measures: Jebsen Taylor Hand Function Test at baseline, training days 1, 5, and 10 and follow-up; Motor Activity Log Rating Scale at baseline, training days 1, 5, and 10 and follow-up; Beck Depression Inventory at baseline, training days 1, 5, and 10 and follow-up; Visual Analogue Scale for Anxiety at baseline, training days 1, 5, and 10 and follow-up Secondary outcome measures: Fugl-Meyer Assessment of Motor Recovery at baseline; Barthel Index Score at baseline; Modified Ashworth Scale at baseline
Starting date	September 2007
Contact information	Julie A Williams, MSc 617-667-5261 jawillia@bidmc.harvard.edu
Notes	Last updated: 9 May 2008

NCT00783913

Study name	Enhancing the beneficial effects of upper extremity visuomotor training with tDCS
Methods	Double-blind RCT in a parallel-group design
Participants	18 people 18 to 85 years of age with ability to sit and be active for an hour on a chair/wheelchair without cardiac, respiratory and/or pain disturbances as assessed during the screening visit; willingness to commit to participate in the long-term follow-up study (up to 3 months); willingness to give written informed consent; diagnosis of a first clinically apparent unilateral cortical or subcortical stroke at least 3 months before study entry Exclusion criteria: history of severe neurological illness, severe cognitive impairment (MMSE < 23); MRI contraindications; history of alcohol or drug abuse; active depression with psychoactive medication changes in the last 2 months, active psychosis, disruptive or violent behavior, poor motivational capacity; aphasia or language disturbances that would interfere with performance of study tasks; uncontrolled medical problems; increased intracranial pressure; severe neglect or ataxia that would interfere with completion of study tasks; history of more than one stroke or a stroke that affects both sides of the brain, the brainstem or the cerebellum; inflammation of the tissue, severe rheumatoid arthritis or abnormal function of the joints due to arthritis in the affected arm used most often; pregnancy
Interventions	Baseline intervention: 1-hour computerised movement training and tDCS sessions twice a day, 5 days a week, for 3 weeks. Participants will sit in front of a computer screen that shows a target (round dots) and a cursor (a line). Participants will be instructed to move the cursor to various targets on the computer screen as fast and as accurately as possible, while controlling the position of the cursor by moving their arm, which will rest on a mechanical device Experimental: A-tDCS stimulation during the first 20 minutes of each training session; electrode sponges soaked in tap water are placed on the scalp and forehead Control: sham tDCS

NCT00783913 *(Continued)*

Outcomes	Primary outcome measures: accuracy (defined as the difference between the straight line connecting the origin and the target and the line followed by the participant) during reaching. 1 of the additional outcomes is the time to complete a reaching task Secondary outcome measure: UE-FM
Starting date	October 2008
Contact information	National Institutes of Health Clinical Center, 9000 Rockville Pike, Bethesda, Maryland, USA
Notes	

NCT00853866

Study name	Enhancement of motor function with reboxetine and transcranial direct current stimulation (STIMBOX)
Methods	Randomised sham-controlled double-blind cross-over trial
Participants	12 people with stroke between 18 and 86 years of age, able to give informed consent, with first-ever ischaemic stroke at least 6 months before study enrolment and paresis of arm/hand muscles above 3 on MRC scale Exclusion criteria: multiple cerebral lesions with associated residual deficits, severe head trauma, seizures, ferromagnetic implants in the head/neck region, pacemaker, other psychiatric or neurological diseases, substance abuse, inability to give informed consent, contraindications for reboxetine (seizures, glaucoma, prostate hyperplasia with urinary retention, cardiac arrhythmias, potential interactions with comedication), pregnancy and breast-feeding
Interventions	4 arms: 1. Experimental group 1: reboxetine + active tDCS: single dose of reboxetine/edrona × 4 mg 80 minutes before assessment of JTT + 20 minutes of 1 mA tDCS during JTFHT assessment with the active electrode over M1 of the lesioned hemisphere 2. Experimental group 2: reboxetine + sham tDCS: single dose of reboxetine/edrona × 4 mg 80 minutes before assessment of JTT + 30 seconds of 1 mA tDCS during JTFHT assessment with the active electrode over M1 of the lesioned hemisphere 3. Experimental group 3: placebo drug + active tDCS: placebo 80 minutes before assessment of JTT + 20 minutes of 1 mA tDCS during JTFHT assessment with the active electrode over M1 of the lesioned hemisphere 4. Experimental group 4: placebo drug + sham tDCS: placebo 80 minutes before assessment of JTT + 30 s of 1 mA tDCS during JTFHT assessment with the active electrode over M1of the lesioned hemisphere
Outcomes	Primary outcome measures: Jebsen Taylor Test at 4 different sessions with 4 different interventions Secondary outcome measures: maximum grip force at 4 different sessions with 4 different interventions; Nine-Hole Peg Test at 4 different sessions with 4 different interventions
Starting date	January 2009
Contact information	Contact: Gianpiero Liuzzi, MD +49 40 7410 ext 59278 g.liuzzi@uke.de

NCT00853866 *(Continued)*

	Contact: Christian Gerloff, MD + 49 40 7410 ext 53770 gerloff@uke.de
Notes	Last updated: 1 December 2010

NCT00909714

Study name	Neuroregeneration enhanced by tDCS in stroke
Methods	Double-blind RCT (parallel assignment)
Participants	250 people aged 18 years and older with subacute stroke (5 to 21 days after stroke), ischaemic subcortical or cortical first-ever strokes and moderate to moderately severe upper extremity hemiparesis (UE-FM between 28 and 50) Exclusion criteria: more than 1 stroke; progressive stroke; completely lesioned hand knob area of M1 affected, cerebellar lesions, history of severe alcohol or drug abuse, psychiatric illnesses such as severe depression, poor motivational capacity or severe language disturbances, or with serious cognitive deficits; severe uncontrolled medical problems; rheumatological or traumatic diseases affecting the upper extremities; other neurological diseases; severe microangiopathy, polyneuropathy, ischaemic peripheral disease; pregnancy; contraindication for MRI or TMS
Interventions	Baseline intervention: standardised upper extremity rehabilitative training; A-tDCS (20 minutes) or sham tDCS will be applied once a day in combination with standardised upper extremity rehabilitative training Experimental: tDCS once a day for 20 minutes + baseline (polarity and dosage not stated) Control: sham tDCS + baseline
Outcomes	Primary outcome measures: UE-FM at 12 months after the end of the intervention period Secondary outcome measures: JTT, ARAT, 9-HPT, SIS, UE-FM at days 11, 40, 100 and 190 after the end of intervention period and at 12 months after the end of the intervention period
Starting date	July 2009
Contact information	Friedhelm Hummel f.hummel@uke.uni-hamburg.de Christian Gerloff gerloff@uke.uni-hamburg.de
Notes	

NCT01007136

Study name	TDCS-enhanced stroke recovery and cortical reorganisation
Methods	Double-blind randomised controlled trial in parallel-group design

NCT01007136 *(Continued)*

Participants	150 people with single ischaemic stroke between 18 and 80 years of age with arm weakness between 5 and 15 days poststroke and no other neurological or psychiatric diseases Exclusion criteria: people with bilateral motor impairment, with poor motivational capacity or history of severe alcohol or drug abuse, people with severe aphasia, MMSE Score < 23; people with severe uncontrolled medical problems (e.g. seizures, progressive stroke syndromes, severe rheumatoid arthritis, active joint deformity of arthritic origin, active cancer or renal disease, end-stage pulmonary or cardiovascular disease, a deteriorated condition due to age or others); people with unstable thyroid disease; people with increased intracranial pressure; people with unstable cardiac arrhythmia; people with contraindication to TMS or tDCS stimulation (pacemaker, an implanted medication pump, a metal plate in the skull, or metal objects inside the eye or skull, patients who had a craniotomy, skin lesions at the site of stimulation); people who are not available for follow-up at 3 and 12 months; pregnancy; people with contraindication to MRI will not participate in MRI
Interventions	2 arms: 1. Experimental: tDCS and occupational therapy: 1 mA electrical current will be delivered over M1 of the lesioned hemisphere for the first 20 minutes during the 1-hour physical therapy 2. Sham comparator: sham and occupational therapy: electrical current will be ramped up and down over M1 of the lesioned hemisphere for the first seconds during the 1 hour physical therapy
Outcomes	Primary outcome measures: UE-FM at 2 weeks, 3 months and 1 year after stroke Secondary outcome measures: JTT at 2 weeks, 3 months and 1 year after stroke; WMFT at 2 weeks, 3 months and 1 year after stroke; MRC grading scale at 2 weeks, 3 months and 1 year after stroke; BI at 2 weeks, 3 months and 1 year after stroke; Abilhand questionnaire at 2 weeks, 3 months and 1 year after stroke; Ashworth Spasticity Scale at 2 weeks, 3 months and 1 year after stroke; Beck Depression Inventory at 2 weeks, 3 months and 1 year after stroke; Visual Analog Pain Scale at 2 weeks, 3 months and 1 year after stroke; Mini Mental Status Scale at 2 weeks, 3 months and 1 year after stroke; NIHSS at 2 weeks, 3 months and 1 year after stroke; Motor Activity Log at 2 weeks, 3 months and 1 year after stroke; fMRI overactivation in motor cortex: voxel count and intensity at 2 weeks, 3 months and 1 year after stroke
Starting date	March 2009
Contact information	Timea Hodics, MD Timea.Hodics@UTSouthwestern.edu Charlotte Bentley Charlotte.Bentley@UTSouthwestern.edu
Notes	

NCT01014897

Study name	tDCS in chronic stroke recovery—pilot
Methods	Double-blind randomised sham-controlled cross-over trial
Participants	45 people between 18 and 80 years of age with single symptomatic stroke more than 3 months ago with hand/arm weakness and ability to perform required tests and provide consent; Modified Ashworth scale < 3; ROM functional at shoulder, elbow, wrist and hand Exclusion criteria: more than 1 symptomatic stroke in MCA territory or bilateral involvement; severe medical or psychiatric conditions, drug abuse, seizure disorder; pregnancy/breast-feeding; SAH, lobar haemorrhage; people who cannot have tDCS (prior head surgery, pacemakers, metallic implants in the head, etc); people taking antiadrenergic medications
Interventions	2 arms:

NCT01014897 *(Continued)*

	1. Experimental: subcortical: subcortical stroke participants will receive tDCS stimulation and sham in random order; tDCS and sham will be applied in random order during standardised occupational therapy 2. Experimental: cortical: participants will receive active and sham tDCS in random order; tDCS and sham will be applied in random order during standardised occupational therapy
Outcomes	Primary outcome measures: WMFT at baseline and after the end of the intervention period; UE-FM at baseline and after the end of the intervention period Secondary outcome measures: adverse events during the intervention period
Starting date	April 2009
Contact information	Timea Hodics, MD Timea.Hodics@UTSouthwestern.edu
Notes	

NCT01127789

Study name	Use of transcranial direct current stimulation (tDCS) to study implicit motor learning on people with brain injury
Methods	Double-blind RCT (parallel assignment)
Participants	Enrolment: 0 People 18 to 65 years of age with TBI or stroke participants with partially preserved fine motor function Exclusion criteria: with metal clips in head or device (e.g. pacemaker); active CNS drugs
Interventions	Experimental: non-invasive brain stimulation (both anodal and C-tDCS will be used)
Outcomes	Primary outcome measures: reaction time (millisecond) of a serial reaction time task at 24 hours postintervention Secondary outcome measures: error rate (percentage) of a serial reaction time task at 24 hours postintervention
Starting date	March 2010
Contact information	Wen-Shiang Chen, MD, PhD Department of Physical Medicine and Rehabilitation, NTUH, Taipei, Taiwan, 100
Notes	Withdrawn prior to enrolment

NCT01143649

Study name	Effects of transcranial DC stimulation coupled with constraint induced movement therapy on motor function in stroke patients
Methods	Double-blind RCT (parallel-group design)

NCT01143649 *(Continued)*

Participants	120 people between 18 and 90 years of age: 40 of whom have first-time ever clinical ischaemic or haemorrhagic cerebrovascular accident confirmed by a radiological or physician's report, with weakness less than 55 (out of 66) on the UE-FM scale; stroke onset > 6 months before study enrolment. The remaining 80 people are healthy volunteers Exclusion criteria: significant prestroke disability, major depression; any substantial decrease in alertness, language reception, or attention that might interfere with understanding instructions for motor testing; excessive pain in any joint of the paretic extremity (not applicable to severe stroke patients), contraindications to single pulse TMS (TMS will be used to measure cortical excitability); contraindications to tDCS, advanced liver, kidney, cardiac or pulmonary disease; terminal medical diagnosis consistent with survival < 1 year; coexistent major neurological or psychiatric disease; history of significant alcohol or drug abuse in the prior 6 months; use of carbamazepine and amitriptyline; patients may not be actively enrolled in a separate intervention study targeting stroke recovery and prior CIMT and/or tDCS treatment for stroke; history of epilepsy before stroke; patients with global aphasia and deficits of comprehension; pregnancy
Interventions	Experimental 1: tDCS + CIMT in stroke participants (40 people), tDCS over M1; intensity 1 mA, for the first 40 minutes of 10 consecutive sessions of CIMT (Monday to Friday) Experimental 2: tDCS + motor training in healthy participants (40 people); 1 day of treatment (when the order in which they receive sham or active tDCS stimulation will be randomly assigned). Each stimulation day will include up to 6 hours of training termed "shaping" in the non-dominant hand, while the dominant hand is restrained in a resting hand splint and is secured in a sling. At the start of this training, participants will undergo 40 minutes of real tDCS at 1 mA or sham tDCS Active comparator: tACS 40 healthy participants, 1 day of treatment (when the order in which they receive sham or active transcranial alternating current stimulation (tACS) stimulation will be randomly assigned), stimulated at 1 mA for 40 minutes
Outcomes	Primary outcome measures: motor function as measured by JTT, MAS, UE-FM, BI at 2 weeks after the end of the intervention period Secondary outcome measures: cortical excitability measured by MEP and the resting motor threshold, intracortical excitability by paired-pulse and also transcallosal inhibition to measure interhemispheric differences
Starting date	April 2010
Contact information	Location: Spaulding Rehabilitation Hospital, Boston, Massachusetts, 02114, USA Investigator: Felipe Fregni, PhD
Notes	

NCT01169181

Study name	AMES + brain stimulation: treatment for profound plegia in stroke
Methods	Not clearly stated
Participants	Estimated enrolment: 6 Inclusion criteria: age 18 to 75 years; stroke more than 1 year prior to enrolment; hemispheric stroke; residual upper-extremity weakness without the ability to activate finger extension volitionally Exclusion criteria: significant upper-extremity proprioceptive deficit; cortical stroke involving M1; unstable epilepsy; Botox injections less than 5 months prior to enrolment; use of intrathecal Ba-

NCT01169181 *(Continued)*

	clofen; residual pain in the affected arm; significant neglect involving the affected limb; exercise intolerance; uncontrolled hypertension or angina; cognitive or behavioural inability to follow instructions; terminal illness; severe apraxia; circumference of arm incompatible with the AMES device; contractures, decreased range of motion, or skin condition preventing tolerance of the AMES device (Assisted Motion with Enhanced Sensation); spinal cord injury; arthritis or fractures of affected limbs, decreasing range of motion; peripheral nerve injury or neuropathy in the affected arm resulting in significant motor or sensory loss; other neurological comorbidities; implanted devices; previous vascular surgery on brain or heart blood vessels; pregnancy
Interventions	2 arms 1. 30 sessions of AMES therapy plus rTMS (20 minutes each) over a 10- to 15-week period 2. 30 sessions of AMES therapy plus tDCS (20 minutes each) over a 10- to 15-week period
Outcomes	Outcomes will be recorded at baseline Primary outcome 1. Maximum volitional EMG in extensor digitorum and the finger flexors Secondary outcome 1. CMSA
Starting date	July 2010
Contact information	Jau-Shin Lou, MD PhD Oregon Health and Science University Portland, Oregon, United States, 97239
Notes	

NCT01207336

Study name	Effect of combined anodal tDCS and peripheral nerve stimulation on motor recovery in acute stroke
Methods	Double-blind RCT (parallel assignment)
Participants	20 people 35 to 85 years of age with first-ever ischaemic stroke within 5 to 30 days; paresis of the arm/hand with NIHSS < 15 Exclusion criteria: pregnancy, psychiatric history, history of substance abuse or severe depression, severe language disturbances, patients with increased intracranial pressure or serious cardiac disease, patients with contraindication to TMS
Interventions	2 arms: 1. Experimental: 1 session of A-tDCS (1.2 mA for 13 minutes) to the ipsilesional primary motor cortex (M1) combined with peripheral radial nerve electrical stimulation (rEPNS) to the paretic hand repeated on 5 successive days, rEPNS (at radial nerve 5 Hz), 0.7* motor threshold 2. Sham: the same rEPNS regimen as in the experimental group but combined with sham tDCS
Outcomes	Primary outcome measures: Jebsen Taylor test at 5, 15 and 30 days

NCT01207336 *(Continued)*

	Secondary outcome measures: grip and wrist force at 5, 15 and 30 days; Nine-Hole Peg Test at 5, 15 and 30 days; cortical excitability of ipsilesional M1 (as measured by TMS) at 5, 15 and 30 days
Starting date	September 2010
Contact information	Marion Simonetta-Moreau, MD, PhD simonetta.m@chu-toulouse.fr
Notes	

NCT01356654

Study name	The use of transcranial direct current stimulation in the recovery of postural control in stroke
Methods	Double-blind randomised controlled cross-over trial
Participants	34 people 18 to 75 years of age, suffering from a stroke in the MCA region, during subacute phase (4 to 24 weeks after onset), hospitalised in rehabilitation Hospital Hof Ter Schelde, Antwerp, Belgium, capable of understanding and giving informed consent Exclusion criteria: cerebellum or brainstem lesions, recent multiple lesions and older lesions manifested clinically, history of severe substance abuse (alcohol, drugs, benzodiazepines), cardiac diseases that in the opinion of the clinician preclude participation in the trial (e.g. severe dyspnoea in rest, severe rhythm disturbances), history of epileptic insults not caused by the stroke, severe organic comorbidity, history of psychiatric disorders, pacemaker/internal defibrillator, pregnancy
Interventions	2 arms: 1. Experimental: tDCS, 20 minutes, 4 times a week for 4 weeks 2. Sham comparator: sham TDCS, 20 minutes, 4 times a week for 4 weeks
Outcomes	Primary outcome measures (at baseline, after one month and after two months): Trunk Impairment Scale (change score); RMAB; Tinetti test
Starting date	March 2010
Contact information	Wim Saeys, MSc, wim.saeys@hotmail.com
Notes	

NCT01405378

Study name	Non-invasive Brain Stimulation for People With Stroke
Methods	RCT
Participants	People after stroke Inclusion criteria: 1. have a confirmed clinical diagnosis of a haemorrhagic or an ischaemic stroke 2. experienced a single (first) stroke or multiple strokes

NCT01405378 *(Continued)*

	3. in the acute, sub-acute or chronic phase of their recovery (the first three to seven days are referred to as the acute phase. The first two weeks to six months are defined as the sub-acute phase, and the chronic phase begins after three or six months 4. have had a subcortical or cortical stroke 5. be over the age of 18 years 6. have any level of upper limb impairment Exclusion criteria: 1. a history of epilepsy due to the fact that TMS could cause an epileptic fit 2. impaired gross cognitive function; score of less than 24 of the Mini-Mental State Examination 3. any metal implants in the head including cochlear implants 4. any another neurological condition apart from stroke 5. are currently participants in another intervention study using TMS/tDCS
Interventions	Robot therapy and transcranial direct current stimulation 2 arms: 1. Experimental: robot therapy and real transcranial direct current stimulation 2. Placebo Comparator: robot therapy and sham tDCS
Outcomes	Measures sensorimotor function of the upper limb
Starting date	2011
Contact information	Jane Burridge, PhD, University of Southampton
Notes	

NCT01500564

Study name	Functional Interest of non invasive brain stimulation during physiotherapy at a subacute phase post stroke (anodal protocol)
Methods	Double-blind RCT (parallel-group design)
Participants	20 people 18 to 80 years of age; participants volunteer to participate in the study, with written informed consent, affiliation with a national health insurance program, first-time ever clinical ischaemic or haemorrhagic cerebrovascular accident as evidenced by a radiological (or physician's) report, contralesional motor deficit with a lesion sparing M1, stroke onset > 1 month and < 6 months before study enrolment Exclusion criteria: coexistent major neurological or psychiatric disease, history of epilepsy before stroke, substantial decrease in alertness, language reception, or attention that might interfere with understanding instructions for motor testing; patients with global aphasia and deficits of comprehension, excessive pain in any joint of the paretic extremity (VAS > 4), contraindications to tDCS such as metal in the head, implanted brain medical devices, history of significant substance abuse in the prior 6 months, antimalarial treatment in the last 72 hours, no prior CIMT/tDCS treatment for stroke; pregnancy
Interventions	Baseline intervention: 20 minutes of motor training during physiotherapy in 10 consecutive sessions (Monday to Friday) during 2 weeks Experimental: baseline intervention + A-tDCS over M1 of the ipsilesional hemisphere; stimulation intensity of 1 mA

NCT01500564 *(Continued)*

	Sham comparator: baseline intervention + sham tDCS over the M1 of the ipsilesional hemisphere
Outcomes	Primary outcome measures: UE-FM (change score from baseline to 2 weeks after the end of the intervention period) Secondary outcome measures (change score from baseline to 2 weeks after the end of the intervention period, 2 weeks, 1 month, 3 months and 6 months later): FIM, MAL, JTT, BBT, MAS, muscle strength as measured by MRC
Starting date	December 2011
Contact information	Sophie Jacquin-Courtois, MD, sophie.courtois@chu-lyon.fr
Notes	

NCT01503073

Study name	Noninvasive brain stimulation for stroke improvement
Methods	Double-blind RCT cross-over trial
Participants	200 persons 18 to 90 years of age with acute or chronic stroke (and with a slight deficit at least) Exclusion criteria: epilepsy, contraindication to tDCS and/or to fMRI, inability to understand/complete behavioural tasks, history of substance abuse, major health condition, presence of pacemaker, pregnancy
Interventions	2 arms: 1. Active comparator: tDCS 2. Sham comparator: sham tDCS
Outcomes	Primary outcome measures: change in function before/after tDCS, any brain function impaired by stroke Secondary outcome measures: change in neuroimaging and neurophysiological outcome measures before/after tDCS: (1) noninvasive neuroimaging: brain activity studied by means of fMRI, (2) noninvasive neurophysiological measure: TMS, EEG, evoked potentials, EMG Time points of their measurement: before intervention, immediately after intervention, 10, 20, 30, 40, 50, 60 minutes after intervention; long-term after intervention: 1, 2, 3 and 4 weeks and 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 months after the end of the intervention period
Starting date	January 2008
Contact information	Yves Vandermeeren, MD, PhD, yves.vandermeeren@uclouvain.be
Notes	

NCT01519843

Study name	Post-stroke procedural learning: from neural substrates to therapeutic modulation by non-invasive brain stimulation

NCT01519843 *(Continued)*

Methods	Double-blind randomised controlled cross-over trial
Participants	200 people 18 to 95 years of age with chronic stroke with an at least slight deficit Exclusion criteria: epilepsy, contraindication to tDCS and/or to fMRI, inability to understand/complete behavioural tasks, history of substance abuse, major health condition, presence of pacemaker, pregnancy
Interventions	2 arms: 1. Active comparator: tDCS 2. Placebo comparator: sham tDCS
Outcomes	Primary outcome measures: motor learning improvement with tDCS from baseline to 4 weeks after the end of the intervention period as measured by a motor skill learning task and by Purdue Pegboard, hand dynamometer, pinch dynamometer, 9-HPT Secondary outcome measures: neuroimaging before motor learning task, during motor learning and after (immediately, 30 minutes, 60 minutes) motor learning; neurophysiological outcome measure (of brain excitability and connectivity with TMS (single and paired pulse)) 5 minutes before motor learning, just at the end of motor learning, after 30 minutes of motor learning, after 60 minutes of motor learning and at 1, 2, 3, and 4 weeks after the day of intervention
Starting date	September 2010
Contact information	Yves Vandermeeren, MD, PhD, yves.vandermeeren@uclouvain.be
Notes	

NCT01544699

Study name	Impact of non-invasive brain stimulation on motor recuperation
Methods	Double-blind randomised controlled cross-over trial
Participants	200 people 18 to 90 years of age with chronic stroke (> 6 months after stroke) and at least a slight deficit in upper or lower limb Exclusion criteria: epilepsy, contraindication to tDCS and/or to fMRI, inability to understand/complete behavioural tasks, history of substance abuse, major health condition, presence of pacemaker, pregnancy
Interventions	2 arms: 1. Active comparator: tDCS 2. Sham comparator: sham tDCS
Outcomes	Primary outcome measures: change in motor function of upper/lower limb before/after tDCS from baseline to immediately after intervention (30 minutes of tDCS) to 10, 20, 30, 40, 50, 60 minutes after intervention and long-term after intervention: 1, 2, 3, and 4 weeks
Starting date	January 2012
Contact information	Yves Vandermeeren, MD, PhD, yves.vandermeeren@uclouvain.be
Notes	

NCT01574989

Study name	Effects of repetitive transcranial magnetic stimulation and transcranial DC stimulation on motor function in stroke patients
Methods	Double-blind randomised controlled cross-over trial
Participants	26 people 18 to 90 years of age Additional inclusion criteria for stroke participants: first-time ever clinical ischaemic or haemorrhagic cerebrovascular events as evidenced by a radiological (or physician's) report; weakness, defined as score of less than 55 (out of 66) on UE-FM scale; stroke onset > 6 months before study enrolment Exclusion criteria: history of major depression, BDI > 30, any substantial decrease in alertness, language comprehension, or attention that might interfere with understanding instructions for motor testing; contraindications to TMS/tDCS; advanced liver, kidney, cardiac or pulmonary disease; terminal medical diagnosis consistent with survival < 1 year; coexistent major neurological or psychiatric disease, history of significant substance abuse in the prior 6 months, patients may not be actively enrolled in a separate intervention study targeting stroke recovery and any other clinical trials, patients with global aphasia and deficits of comprehension, pregnancy, neuropsychotropic medication (healthy people only) Additional exclusion criteria for stroke patients: patients may not have already received TMS and/or tDCS stimulation for stroke, history of epilepsy before stroke or episodes of seizures within the last 6 months
Interventions	Participants will receive 5 sessions of stimulation. They will undergo (1) active low-frequency rTMS (1 Hz continuous), (2) active high-frequency rTMS (10 Hz, 2-second trains with intertrain interval of 28 seconds) or (3) sham rTMS (using a sham coil). Each session will last 20 minutes and will be conducted at 100% of the motor threshold. Each tDCS session will last 20 minutes and will be conducted using 1 mA with 35 cm^2 electrodes Experimental 1: single session of active low-frequency rTMS/sham tDCS on the scalp during the 20-minute session Experimental 2: single session of active high-frequency rTMS/sham tDCS on the scalp during the 20-minute session Experimental 3: single session of sham rTMS/active anodal tDCS on the scalp during the 20-minute session Experimental 4: single session of sham rTMS/active C-tDCS on the scalp during the 20-minute session Sham comparator: single session of sham rTMS/sham tDCS on the scalp during the 20-minute session
Outcomes	Primary outcome measures: changes in cortical excitability measures using single- and paired-pulse TMS before and after each single stimulation session Secondary outcome measures: changes in motor function as measured by behavioural tasks (e.g. Purdue pegboard, JTT, ROM) both before and after the stimulation sessions Time frame: measured for approximately 6 weeks
Starting date	May 2011
Contact information	Felipe Fregni, MD, PhD, MPH, ffregni@partners.org Kayleen M Weaver, BA, kmweaver@partners.org

NCT01574989 *(Continued)*

Notes	

NCT01644929

Study name	Rehabilitation combined with bihemispheric transcranial direct current stimulation in subacute ischemic stroke to increase upper limb motor recovery: a randomised, controlled, double-blind study (RECOMBINE)
Methods	Double-blind randomised controlled cross-over trial (multicentre)
Participants	36 people 18 years of age or older with subcortical or subcortical/cortical ischaemic lesions in the territory of MCA, as confirmed by neuroimaging in the subacute phase (2 to 4 weeks after stroke) with persistent hemiparesis (score of 1 to 3 on the motor arm item of the NIH Stroke Scale (NIHSS) but wrist and finger movement is not required) and no upper extremity injury or conditions that limited its use before the stroke; subscription of informed consent Exclusion criteria: history of epilepsy, brain tumour, major head trauma, learning disorder, severe cognitive impairment, drug or alcohol abuse, major psychiatric illness. Use of medications that may lower seizure threshold (e.g. metronidazole, fluoroquinolones), severe pain in the affected upper limb (≥ 8 on the shoulder item of the "joint pain during passive motion" of the UE-FM); re-current stroke or other significant medical complications during the study; evidence of severe leu-coencephalopathy (grade IV according to Fazeka's scale); significant aphasia that would impair un-derstanding and performance on assessment scales
Interventions	Each participant receives standardised physical/occupational treatment according to the Impair-ment-Oriented Training, plus 1 of the following treatment schemes: 1. Experimental 1: A-tDCS of the ipsilesional motor cortex and C-tDCS of the contralesional motor cortex (1.5 mA, 30 minutes) for 15 days during 3 weeks, then sham stimulation for 30 seconds on 15 days during 3 weeks 2. Experimental 2: sham tDCS for 30 seconds on 15 days during 3 weeks, then A-tDCS of the ipsile-sional motor cortex and C-tDCS of the contralesional motor cortex (1.5 mA, 30 minutes) for 15 days during 3 weeks 3. Sham comparator: treatment for 6 weeks daily with sham tDCS for 30 seconds on 15 days during 6 weeks
Outcomes	Primary outcome measures: UE-FM at the end of the intervention period Secondary outcome measures: UE-FM at 3 weeks and at 6 months; BI at 3 weeks, at 6 weeks and at 6 months; Ashworth scale at 3 weeks, at 6 weeks and at 6 months; Test of Upper Limb Apraxia (TULIA) at 6 weeks and at 6 months; grip strength at 3 weeks, at 6 weeks and at 6 months; Hamilton Depression Rating Scale at 6 weeks and at 6 months
Starting date	September 2012
Contact information	Carlo Cereda, MD, Carlo.Cereda@eoc.ch René Müri, MD, rene.mueri@insel.ch
Notes	

NCT01726673

Study name	Effects of transcranial direct current stimulation paired with robotic arm therapy on recovery of upper extremity motor function in stroke patients
Methods	Double-blind RCT (parallel assignment)
Participants	66 people 18 years of age or older with first single focal unilateral lesion as verified by brain imaging at least 6 months after stroke, with cognitive function sufficient to understand experiments and follow instructions; FMA of 7 to 58 out of 66 (neither hemiplegic nor fully recovered motor function in the muscles of the shoulder, elbow and wrist) Exclusion criteria: Botox treatment within 6 weeks of enrolment, fixed contraction of the affected limb, complete flaccid paralysis of the affected limb, history of haemorrhagic stroke, ongoing use of CNS active or psychoactive medications, presence of additional potential tDCS/TMS risk factors, including damaged skin at the site of stimulation, presence of a magnetically/mechanically active implant, metal in the head, family history of epilepsy and personal history of seizures
Interventions	2 arms: 1. Experimental arm: tDCS + robotic arm therapy, 2 mA for 20 minutes over M1 in the lesioned hemisphere, followed by robotic arm therapy for 60 minutes, 3 times per week for 12 weeks 2. Placebo comparator arm: sham tDCS + robotic arm therapy (0 mA) for 20 minutes over M1 in the lesioned hemisphere, followed by robotic arm therapy for 60 minutes, 3 times per week for 12 weeks
Outcomes	Primary outcome measures: change from baseline in UE-FM at the end of the intervention period and at 6 months of follow-up Secondary outcome measures: change from baseline in kinematic data (upper extremity mobility as measured by Interactive Motion Technologies planar (shoulder/elbow) robot and wrist (wrist flexion/extension and pronation/supination) robots during therapy and evaluations) at the end of the intervention period and at 6 months of follow-up; change from baseline in WMFT at the end of the intervention period and at 6 months of follow-up; change from baseline Motor Power Manual Muscle Test at the end of the intervention period and at 6 months of follow-up; change from baseline NIH stroke scale at the end of the intervention period and at 6 months of follow-up; change from baseline SIS at the end of the intervention period and at 6 months of follow-up
Starting date	September 2012
Contact information	Bruce T Volpe, MD, bvolpe1@nshs.edu Johanna Chang, MS, jchang14@nshs.edu
Notes	

NCT01807637

Study name	Using transcranial direct current stimulation to jump start gait training in chronic stroke patients
Methods	RCT with parallel-group design
Participants	Estimated enrolment: 88 Inclusion criteria: stroke > 3 months prior to enrolment; unilateral stroke; MRI-confirmed; age > 30 years; complete NIHSS; sufficient endurance motor ability and balance to ambulate at least 10 meters; ankle dorsiflexion passive ROM > 0°; demonstrating foot-drop during ambulation such that gait instability or inefficient gait patterns are exhibited; pass the TMS Adult Safety Screen (TASS)

NCT01807637 *(Continued)*

	Exclusion criteria: oedema; skin breakdown; absent sensation of the affected lower limb, which interferes with the peroneal nerve stimulator; serious cardiac arrhythmia; pacemakers or any other implanted electronic systems; pregnancy; uncontrolled seizures; Parkinson's Disease; spinal cord injury, traumatic brain injury; multiple sclerosis; fixed ankle plantar flexor contracture; history of dementia, severely impaired cognition, communication or comprehension; severe or frequent headaches; history of BOTOX injection within 3 months prior to enrolment; receiving other forms of electrical stimulation; other medical conditions or medications that compromise ambulation or balance; PI's or Medical Monitor's discretion not to include a participant
Interventions	2 arms: 1. A-tDCS over the low extremity representation of M1 of the affected hemisphere (dosage not stated) 2. Sham tDCS over the low extremity representation of M1 of the affected hemisphere (30 seconds)
Outcomes	Outcomes will be recorded at baseline, at 1 week, 1 month and at 6 months postintervention Primary outcome measure 1. change from baseline in ankle dorsiflexion during the swing phase of gait Secondary outcome measures 1. change from baseline in slope of cortical recruitment curve 2. change from baseline in SIS scores
Starting date	March 2013
Contact information	Chad I Lairamore, PhD; chadl@uca.edu University of Central Arkansas Conway, Arkansas, United States, 72035
Notes	

NCT01828398

Study name	tDCS and robotic therapy in stroke
Methods	RCT with parallel-group design
Participants	Estimated enrolment: 40 Inclusion criteria: age > 18 years; first-ever ischaemic stroke; impairment of the upper limb; TCT score > 50 Exclusion criteria: insufficient understanding in Italian to complete any test; MMSE-score < 24; contraindications to single-pulse TMS; history of epilepsy; frequent headaches or neck pain; implanted devices; contraindications to tDCS; neurological or psychiatric pathology; severe cardio-pulmonary, renal, hepatic diseases; pregnancy
Interventions	2 arms 1. Dual-tDCS with the anode placed over M1 of the affected hemisphere and the cathode placed over M1 of the unaffected hemisphere (1 mA for 30 min) plus robotic therapy (5 times a week for 30 minutes for 2 weeks)

NCT01828398 *(Continued)*

	2. Sham tDCS (not explicitly described) plus robotic therapy (5 times a week for 30 minutes for 2 weeks)
Outcomes	Outcomes will be recorded at baseline (further time points not stated) Primary outcome measure: 1. UE-FM Secondary outcome measures 1. BBT 2. MAS 3. MAL 4. Cortical excitability
Starting date	November 2011
Contact information	Sofia Straudi, MD University Hospital of Ferrara Ferrara, Italy
Notes	

NCT01847157

Study name	Transcranial direct current stimulation combined sensory modulation intervention in chronic stroke patients
Methods	RCT
Participants	Stroke
Interventions	2 arms 1. tDCS & epidermis anesthesia & repeated passive movement 2. sham tDCS & sham anesthesia & repeated passive movement
Outcomes	FMA
Starting date	2013
Contact information	National Taiwan University Hospital
Notes	

NCT01883843

Study name	Efficacy of a task-oriented circuit training associated with transcranial direct current stimulation (tDCS) for gait improvement in chronic stroke patients. A randomised controlled trial
Methods	RCT with parallel-group design

NCT01883843 *(Continued)*

Participants	Estimated enrolment: 21 Inclusion criteria: aged between 18 and 75 years; diagnosis of first-ever ischaemic stroke > 6 months prior to enrolment; MMSE > 24; FAC ≥ 4 Exclusion criteria: contraindications to tDCS; neurological or psychiatric pathology; severe cardio-pulmonary, renal or hepatic disease; pregnancy
Interventions	2 arms: 1. A-tDCS over the lower leg area of M1 of the lesioned hemisphere (0.5 mA for 15 minutes) for 10 consecutive days after rehabilitation treatment in the gym 2. sham tDCS over the lower leg area of M1 of the lesioned hemisphere (0.5 mA for 20 seconds) for 10 consecutive days after rehabilitation treatment in the gym
Outcomes	Outcomes will be recorded at baseline, at 1 week after treatment end and at 3 months follow-up Primary outcome measure: 1. Change in 6MWT Secondary outcome measures: 1. TUG 2. UBS 3. FSS 4. SIS 3.0 5. SS-QOL
Starting date	May 2013
Contact information	Sofia Straudi, MD Ferrara Rehabilitation Hospital Ferrara, Italy, 44124
Notes	

NCT01897025

Study name	Combined transcranial direct current stimulation and motor imagery-based robotic arm training for stroke rehabilitation - a feasibility study
Methods	RCT with parallel-group design
Participants	Estimated enrolment: 32 Inclusion criteria: first-ever stroke more than 9 months prior to study enrolment; upper extremity impairment of 11 to 45 on the Fugl-Meyer assessment scale Exclusion criteria: epilepsy; neglect; cognitive impairment; other neurological or psychiatric diseases; severe arm pain; spasticity score > 2 MAS in shoulder/elbow joint; contraindications to TMS or tDCS; grip strength < 10 kg as measured by dynamometer; participation in other interventions or trials targeting motor recovery
Interventions	2 arms

NCT01897025 *(Continued)*

	1. A-tDCS with the anode placed over M1 of the affected hemisphere and the cathode placed over M1 of the unaffected hemisphere (1 mA for 20 minutes) followed by MI-BCI training with the MIT-Manus for 40 minutes (10 sessions over 2 weeks) 2. Sham tDCS with the anode placed over M1 of the affected hemisphere and the cathode placed over M1 of the unaffected hemisphere (1 mA for 30 seconds) followed by MI-BCI training with the MIT-Manus for 40 minutes (10 sessions over 2 weeks)
Outcomes	Outcomes will be recorded at baseline, at the end of intervention period and 4 weeks after the end of intervention period Primary outcome measure 1. UE-FM Secondary outcome measures 1. Resting Motor Threshold of M1 of the affected hemisphere 2. Grip strength 3. BBT 4. MRI parameters
Starting date	January 2011
Contact information	Effie Chew, MD National University Hospital Singapore, Singapore, 119074
Notes	

NCT01907737

Study name	Combined brain and peripheral nerve stimulation for stroke
Methods	RCT
Participants	Stroke
Interventions	4 arms 1. active tDCS and active PNS 2. active tDCS and sham PNS 3. sham tDCS and active PNS 4. sham tDCS and sham PNS
Outcomes	Active range of motion of wrist extension in the paretic side
Starting date	2013
Contact information	Adriana Bastos Conforto, University of Sao Paulo General Hospital
Notes	

NCT01969097

Study name	Efficacy basics of bihemispheric motorcortex stimulation after stroke
Methods	RCT with parallel-group design
Participants	Estimated enrolment: 50 Inclusion criteria: aged between 18 and 80 years; chronic stroke (> 6 months after stroke) Exclusion criteria: more than 1 stroke; severe alcohol disease or drug abuse; severe psychiatric disease like depression or psychosis; severe cognitive deficits; severe untreated medical conditions; other neurologic diseases; severe microangiopathy; pregnancy
Interventions	3 arms: 1. dual-tDCS plus motor training (25 minutes/day) for 5 days 2. A-tDCS plus motor training (25 minutes/day) for 5 days 3. sham tDCS plus motor training (25 minutes/day) for 5 days
Outcomes	Outcomes will be recorded at baseline and at the end of intervention period Primary outcome measures 1. Change in motor function of the affected upper extremity after the end of intervention period 2. Change in motor function of the affected upper extremity at 3-months follow-up Secondary outcome measures 1. Motor function of the affected upper extremity after the end of intervention period 2. Motor function of the affected upper extremity at 3-months follow-up 3. fMRI at the end of intervention period and at 3-months follow-up 4. DTI at the end of intervention period and at 3-months follow-up 5. TMS at the end of intervention period
Starting date	May 2012
Contact information	Robert Lindenberg, M.D. Charite Universitätsmedizin Berlin Berlin, Germany, 10117
Notes	

NCT01983319

Study name	Transcranial direct current stimulation combined with constraint induced movement therapy and role of GABA activity in stroke recovery
Methods	RCT with parallel-group design
Participants	Estimated enrolment: 64 Inclusion criteria: age between 18 and 80 years; stroke > 3 months prior to enrolment; > 10° mobility in the wrist, thumb and fingers of the affected side; ability to move, stand up and stand firmly with constraint healthy hand; ability to perform training 6 hours daily in 2 weeks; being able to understand instructions and to co-operate

NCT01983319 *(Continued)*

	Exclusion criteria: contraindication to MRI of the brain; pregnancy; epilepsy, major psychiatric diseases; excessive pain, preventing treatment; history of other diseases resulting in decreased mobility of affected upper limb
Interventions	3 arms: 1. A-tDCS over upper extremity representation of M1 (1.5 mA for 30 minutes) during CIMT for 10 consecutive daily sessions on workdays 2. sham tDCS over upper extremity representation of M1 (dosage not described) during CIMT for 10 consecutive daily sessions on workdays 3. no Intervention (20 healthy age-matched control participants will undergo MRI spectroscopy of the brain)
Outcomes	Primary outcome measures (measured at baseline and at the end of intervention) 1. Change in WMFT 2. Change in UE-FM Secondary outcome measures 1. GABA activity (at baseline) 2. BBT after single session of tDCS
Starting date	September 2013
Contact information	Krystian Figlewski, MD Regionhospital Hammel Neurocenter, Research Unit Hammel, Denmark, 8450
Notes	

NCT02080286

Study name	Boosting the therapeutic benefits of prism adaptation by combining it with tDCS
Methods	Randomised cross-over trial
Participants	Estimated enrolment: 40 Inclusion criteria: aged 18 to 85 years; right-hemispheric stroke at least 1 month prior to enrolment;diagnosis of neglect confirmed by the Behavioural Inattention Test (BIT) Exclusion criteria: adequate understanding of English, sufficient to give informed consent; limited verbal communication in the form of dysphasia; history of drug abuse; history of dementia or other psychiatric conditions
Interventions	3 arms 1. A-tDCS over the left/unaffected M1 (1 mA for 20 minutes) on 5 consecutive daily sessions during prism adaptation therapy 2. sham tDCS over the left/unaffected M1 (1 mA for 20 minutes) on 5 consecutive daily sessions during prism adaptation therapy 3. prism adaptation therapy (20 minutes) on 5 consecutive daily sessions during prism adaptation therapy
Outcomes	Primary outcome measures

NCT02080286 *(Continued)*

	1. BIT (at week 0 and at week 8) 2. Neglect Test Battery (at baseline and at weeks 1, 2, 4 and 8) Secondary outcome measure: 1. Changes in brain imaging data (at baseline and at week 5)
Starting date	February 2014
Contact information	Jacinta O'Shea FMRIB Centre, John Radcliffe Hospital, University of Oxford Oxford, United Kingdom, OX3 9DU
Notes	

NCT02109796

Study name	A controlled, randomised study evaluating the immediate effect of one tDCS session on quadriceps strength in hemiparetic patients
Methods	Randomised cross-over trial
Participants	Estimated enrolment: 30 Inclusion criteria: written informed consent; stroke > 6 months prior to enrolment; hemiparesis; ability to walk with or without technical assistance; following rehabilitation program for lower limbs Exclusion criteria: patient with bilateral brain lesion; cerebellar syndrome; apraxia; aphasia; previous orthopedic surgery in paretic lower limb (< 6 months); usual tDCS contraindications; pregnancy
Interventions	No detailed information provided except the following quotation: "We test a new electrode configuration: a anodal stimulation opposite to the cortical representation area of the injured hemisphere and a simultaneous stimulation opposite to the homonyme the cortical representation area of the healthy hemisphere. We hypothesis that one session of tDCS with this electrode configuration allow to improve paretic quadriceps strength in hemiparetic patients after stroke."
Outcomes	Outcomes will be recorded at baseline and 2 hours after the end of intervention Primary outcome measure 1. Maximum voluntary strength of knee extensors Secondary outcome measures 1. Resistive peak torque during passive knee flexion 2. Angle related to the resistive peak torque generation of the knee extensors 3. Amplitude of the interpolation twitch 4. EMG activation of the knee flexors and extensors during the strength evaluations (active and passive) 5. Functional evaluation of the gait performance and balance
Starting date	February 2015
Contact information	Roche Nicolas, MD PH

NCT02109796 *(Continued)*

	Raymond Poincare Hospital Garches, France, 92380
Notes	

NCT02134158

Study name	Impact of tDCS on locomotion and equilibrium in hemiplegic patients (HEMILOCOSTICOR)
Methods	RCT crossover assignment
Participants	Stroke
Interventions	2 arms: 1. sham -tDCS and then anodal-tDCS 2. anodal-tDCS and then sham -tDCS
Outcomes	Variability of the center-of-mass movement
Starting date	2014
Contact information	Assistance Publique - Hôpitaux de Paris
Notes	

NCT02156635

Study name	A double-blind, sham-controlled, randomised clinical trial on stroke treatment using transcranial direct current stimulation
Methods	RCT with parallel-group design
Participants	Estimated enrolment: 40 Inclusion criteria: aged between 18 and 65 years; acute ischaemic stroke; informed consent Exclusion criteria: NIHSS between 25 and 32; Rankin ≥ 5; MMSE ≤ 24; use of drugs changing CNS excitability; metallic implants; seizures; pregnancy; other conditions interfering with CIMT criteria; inability to voluntarily execute wrist flexion, 10° of finger extension and 20° of wrist extension
Interventions	2 arms: 1. active tDCS plus CIMT daily for 10 consecutive working days 2. sham tDCS plus CIMT daily for 10 consecutive working days
Outcomes	Primary outcome measure 1. BI (at 4 months) Secondary outcome measures 1. MoCA (at baseline and at the end of intervention period)

NCT02156635 *(Continued)*

	2. Victoria version of the Stroop Color and Word Test (at baseline and at the end of intervention period) 3. Digit span test (at baseline and at the end of intervention period) 4. Spasticity (at baseline and at the end of intervention period) 5. Muscle strength (at baseline and at the end of intervention period) 6. Balance (at baseline and at the end of intervention period) 7. Posture (at baseline and at the end of intervention period) 8. Fear of falling during daily life activities (at baseline and at the end of intervention period) 9. Upper limb function (at baseline and at the end of intervention period) 10. Quality of Life (at baseline and at the end of intervention period) 11. Lower limb function (at baseline and at the end of intervention period)
Starting date	June 2014
Contact information	Suellen Marinho Andrade, MSc Federal University of Paraíba, Department of Psychology João Pessoa, Paraíba, Brazil, 58051-900
Notes	

NCT02166619

Study name	Transcranial direct current stimulation in rehabilitation of chronic stroke patients: multicenter clinical trial
Methods	Randomised controlled trial with parallel-group design
Participants	Estimated enrolment: 24 Inclusion criteria: age between 40 and 80 years; primary or recurrent stroke, confirmed by CT or MRI; stroke > 12 months prior to enrolment; upper limb impairment due to stroke; MMSE ≥ 18; Ashworth Scale ≥ 4; minimal active wrist movement (flexion and extension); at least one pinch movement Exclusion criteria: prior neurological diseases; multiple brain lesions; metal implant in the head; pacemaker; history of seizures; epilepsy; pregnancy; haemodynamic instability; cointervention of physical therapy elsewhere during the study; initial UE-FM > 59; traumatic or orthopaedic lesion limiting the range of motion of the upper limb
Interventions	2 arms: 1. dual-tDCS with the anode over the affected hemisphere and the cathode over the unaffected hemisphere (2 mA for 20 minutes) followed by 40 minutes of physical therapy 5 times per week for 2 weeks 2. sham tDCS with the anode over the affected hemisphere and the cathode over the unaffected hemisphere (2 mA for 20 minutes) followed by 40 minutes of physical therapy 5 times per week for 2 weeks
Outcomes	Outcomes will be recorded at baseline and at days 30 and 90 Primary outcome measure: 1. Change in UE-FM Secondary outcome measures:

NCT02166619 *(Continued)*

	1. Change in MAL-30 2. Other outcome measures: 3. Change in JTT
Starting date	December 2013
Contact information	Kátia Monte-Silva, PhD Déborah Marques, PT Applied Neuroscience Laboratory, Universidade Federal de Pernambuco Recife, PE, Brazil, 50670-900
Notes	

NCT02209922

Study name	The effects of tDCS combined with balance training on postural control and spasticity in chronic stroke patients (a randomised controlled trial)
Methods	RCT with parallel-group design
Participants	Estimated enrolment: 40 Inclusion criteria: age between 18 and 80 years; first ischaemic MCA stroke > 6 months prior to enrolment; Romberg test > 30 seconds Exclusion criteria: haemorrhagic stroke; other neurological conditions affecting balance
Interventions	2 arms: 1. active tDCS (2 mA for 20 minutes) and simultaneous balance training (10 to 15 minutes) for 5 consecutive days 2. sham tDCS and simultaneous balance training for 5 days
Outcomes	Outcomes will be recorded at baseline and 1 week after the end of intervention Primary outcome measures 1. BBS 2. Linear and nonlinear approximate entropy outcome measures for COP Secondary outcome measures 1. MAS 2. H-reflex
Starting date	December 2014
Contact information	Fariba Yadolahi ShahidBeheshti Univesity of Medical sciences Tehran, Iran, Islamic Republic of, 1616931111
Notes	

NCT02210403

Study name	The Influence of tDCS on the arm and hand function in stroke patients
Methods	Randomised cross-over trial
Participants	Estimated enrolment: 26 Inclusion criteria: age above 18 years; stroke onset > 6 months prior to enrolment; first-ever stroke; decreased hand and arm function; MMSE > 24 Exclusion criteria: depression; pregnancy; alcohol abuse; aneurysm clips; pacemaker; neurostimulator; implemented defibrillator; magnetically activated implant or device; implemented pump; spinal cord stimulator; implemented hearing aid; artificial or prosthetic limb; metal parts in the body; any external or internal metal; artificial heart valve; other implants; history of brain surgery migraine; family history of epilepsy
Interventions	2 arms: 1. dual-tDCS plus upper limb motor training 2. sham tDCS plus upper limb motor training
Outcomes	Outcomes will be recorded at baseline, at the 3rd intervention day and at 1 week postintervention Primary outcome measure 1. Change in UE-FM Secondary outcome measure 1. Change in MAS Other outcome measure 1. Change in motor task performance
Starting date	April 2013
Contact information	Xue Zhang K U Leuven Leuven, Belgium, 3000
Notes	

NCT02213640

Study name	Potentiation of the effects of prismatic adaptation by transcranial direct current stimulation (tDCS): evaluation of functional interest in negligence rehabilitation
Methods	RCT with parallel-group design
Participants	Estimated enrolment: 24 Inclusion criteria: age between 18 and 80; right-handedness; unilateral neglect due to right-hemispheric stroke, radiologically confirmed; hospitalised in the Department of Physical Medicine and Rehabilitation or external monitoring; diagnosis of negligence as indicated by BIT score ≤ 129; stroke > 1 month prior to enrolment

NCT02213640 *(Continued)*

	Exclusion criteria: degenerative neurological condition; uncontrolled epilepsy; temporo-spatial disorientation; language disorders or psychiatric disorders interfering with understanding instructions; history of prior stroke; multiple stroke; unstable medical condition; pregnancy; implanted materials; unweaned alcoholism
Interventions	2 arms: 1. A-tDCS over M1 (1 mA for 20 minutes) plus prismatic adaptation on 5 consecutive sessions 2. sham tDCS over M1 plus prismatic adaptation on 5 consecutive sessions
Outcomes	Outcomes will be recorded at baseline, at the end of intervention (5 weeks) and 2, 6 and 15 weeks after the end of intervention Primary outcome measure 1. BIT Secondary outcome measures: 1. BTN 2. Functional independence scale (MIF) 3. Cahterine Bergego Scale (ECB) 4. Jamar dynamometer
Starting date	September 2014
Contact information	Sophie Jacquin-Courtois, MD-PhD Laurent Villeneuve, CRA Hospices Civils de Lyon
Notes	

NCT02254616

Study name	Hybrid approach to mirror therapy and transcranial direct current stimulation for stroke recovery: a follow up study on brain reorganisation, motor performance of upper extremity, daily function, and activity participation
Methods	Randomised controlled trial with parallel-group design
Participants	Estimated enrolment: 80 Inclusion criteria: first stroke in cortical regions; time since stroke > 6 months prior to enrolment; initial UE-FM score between 24 to 52; MAS ≤ 2 in any joints of the affected arm; MMSE ≥ 24; willing to sign the informed consent Exclusion criteria: aphasia interfering with understanding instructions; visual/attention impairments that might interfere with the seeing of mirror illusion, including hemineglect/hemianopsia; currently participation in any other research; previous brain neurosurgery; metallic implants within the brain
Interventions	4 arms: 1. active tDCS (1.5 mA for 20 minutes) followed by mirror therapy (40 minutes) and functional training (30 minutes) during the first 2 weeks, and 60 minutes pure mirror therapy followed by 30 minutes functional training during the last 2 weeks

NCT02254616 *(Continued)*

	2. sham tDCS (20 minutes) followed by mirror therapy (40 minutes) and functional training (30 minutes) during the first 2 weeks, and 60 minutes pure mirror therapy followed by 30 minutes functional training during the last 2 weeks 3. mirror therapy for 60 minutes per session followed by 30 minutes functional training 4. 60 minutes conventional stroke rehabilitation intervention followed by 30 minutes functional training
Outcomes	Primary outcome measures 1. Change in UE-FM (at baseline, 2, 4, 16 and 28 weeks) 2. Change in WMFT (at baseline, 2 and 4 weeks) 3. Change in MAL (at baseline, 2, 4, 16 and 28 weeks) 4. Change in rNSA (at baseline and 4 weeks) Secondary outcome measures 1. Change in AAP (at baseline, 4, 16 and 28 weeks) 2. Change in 10MWT (at baseline and 4 weeks) 3. Change in actigraphy (at baseline and 4 weeks) 4. Change in kinematic analysis (at baseline and 4 weeks) 5. Change of hand strength (at baseline, 2 and 4 weeks) 6. Change of Stroop Test (at baseline and 4 weeks) 7. Change of pressure pain threshold (at baseline and 4 weeks)
Starting date	August 2014
Contact information	Ching-Yi Wu, ScD Chang Gung Memorial Hospital Kwei-Shan, Tao-Yuan, Taiwan, 333
Notes	

NCT02292251

Study name	Study to enhance motor acute recovery with intensive training after stroke
Methods	RCTwith factorial assignment
Participants	Estimated enrolment: 72 Inclusion criteria: age over 21 years; first or recurrent ischaemic stroke < 5 weeks prior to enrolment, confirmed by CT or MRI; residual unilateral arm weakness with UE-FM between 6 and 40; informed consent; ability to understand the tasks involved Exclusion criteria: prior stroke with resulting motor deficits; space-occupying haemorrhagic transformation or associated intracranial haemorrhage; recent Botox injection to upper limb or planned Botox injection over the course of the 7-month study duration; MoCA ≤ 20; history of physical or neurological condition that interferes with study procedures or assessment of motor function; contraindications to tDCS; inability to sit in a chair and perform upper limb exercises for one hour at a time; participation in another upper extremity rehab study or tDCS study during the study period; terminal illness; social or personal circumstances that interfere with the ability to return for therapy sessions and follow-up assessments
Interventions	3 arms:

NCT02292251 *(Continued)*

	1. active tDCS plus robot-assisted arm therapy with the ArmeoPower device (30 hours in total) 2. sham tDCS plus robot-assisted arm therapy with the ArmeoPower device (30 hours in total) 3. conventional occupational therapy that emphasises task-oriented training
Outcomes	Primary outcome measure 1. Change in UE-FM (from baseline to the end of intervention) Secondary outcome measure 1. Change in UE-FM (from baseline to 3 months follow-up)
Starting date	May 2015
Contact information	John Krakauer, MD Johns Hopkins University Baltimore, Maryland, United States, 21205
Notes	

NCT02308852

Study name	Improving bi-manual activities in stroke patients with application of neurostimulation
Methods	Randomised cross-over trial
Participants	Estimated enrolment: 100 Inclusion criteria: age between 18 and 95 years; stroke with at least slight deficit Exclusion criteria: epilepsy; contraindications to tDCS and fMRI; presence of metal in the head; inability to understand/complete behavioural tasks; chronic substance abuse; major health condition; pacemaker; pregnancy
Interventions	2 arms: 1. active tDCS (20 minutes) during bimanual task training 2. sham tDCS (20 minutes) during bimanual task training
Outcomes	Primary outcome measure 1. Bimanual co-ordination (at the end of intervention and at 1 week and up to 2, 3, 4 weeks after the intervention) Secondary outcome measures 1. Standard unimanual evaluation (i.e. PPT, hand dynamometer, pinch dynamometer, 9-HPT, motor skill learning with a video game; measured immediately, 30, 60 and up to 120 minutes after the intervention; follow-up tests at 1 week and up to 2, 3, 4 weeks after the intervention)
Starting date	October 2014
Contact information	Yves Vandermeeren, MD,PhD University Hospital CHU Dinant Godinne UcL Namur Yvoir, Belgium, 5530

NCT02308852 *(Continued)*

Notes	

NCT02325427

Study name	Changes in cortical excitability associated with upper limb motor recovery - a study of neural strategies employed in motor recovery
Methods	RCT with parallel-group design
Participants	Estimated enrolment: 119 Inclusion criteria: age 21 to 80 years; first-ever hemiplegic stroke < 2 weeks prior to study enrolment; UE-FM between 0 and 45; MMSE ≥ 24; ability to provide informed consent Exclusion criteria: pregnancy; cardiac pacemakers; metal implants; history of epilepsy; sensorimotor impairments due to other causes than stroke; uncontrolled medical conditions; diabetes mellitus and unstable angina; major depression and history of psychotic disorders
Interventions	3 arms: 1. A-tDCS with the anode placed over the cortical representation of the hand of M1 of the affected hemisphere (1 mA for 20 minutes) 2. sham tDCS with the anode placed over the cortical representation of the hand of M1 of the affected hemisphere (1 mA for 20 minutes) 3. no intervention
Outcomes	Primary outcome measure 1. Cortical excitability (up to 6 months poststroke) Secondary outcome measures 1. MAS (at 5 to 14 days, 4 to 6 weeks and 6 months poststroke) 2. Manual muscle testing (at 5 to 14 days, 4 to 6 weeks and 6 months poststroke) 3. BBT (at 5 to 14 days, 4 to 6 weeks and 6 months poststroke) 4. UE-FM (at 5 to 14 days, 4 to 6 weeks and 6 months poststroke)
Starting date	November 2014
Contact information	Effie Chew, MD National University Hospital Singapore, Singapore, 119074
Notes	

NCT02389608

Study name	The immediate effect of electrical stimulation transcranial direct current (tDCS) associated with the use of FES, in muscle activity of the tibialis anterior muscle, balance and plantar pressure distribution of individuals with hemiparesis due to stroke - randomised, double blind
Methods	Randomised cross-over trial

NCT02389608 *(Continued)*

Participants	Estimated enrolment: 30 Inclusion criteria: age above 20 years; hemiparesis due to stroke; ability to maintain a standing position without an assistance device for at least 60 seconds; signed informed consent Exclusion criteria: other health condition or use of medication affecting balance; positive cutoff point for cognitive deficit (MMSE); illiteracy; Wernicke's aphasia; reduced ankle mobility due to history of ankle fracture and use of pins in ankle; strength less than grade 1 in the tibialis anterior muscle; tDCS contraindication; skin infection at the tDCS/FES site; anaesthesia/hyperaesthesia at FES site
Interventions	Each participant will undergo all of the following conditions: 1. A-tDCS over M1 (2 mA for 20 minutes) + sham FES over the tibialis anterior muscle + active tibialis anterior muscle contraction 2. sham tDCS over M1 + active FES over the tibialis anterior muscle + active tibialis anterior muscle contraction 3. A-tDCS over M1 (2 mA for 20 minutes) + active FES over the tibialis anterior muscle + active tibialis anterior muscle contraction 4. sham tDCS over M1 + sham FES over the tibialis anterior muscle + active tibialis anterior muscle contraction
Outcomes	Outcomes will be recorded at baseline and at 1 year after the end of intervention period Primary outcome measure 1. EMG activity of tibialis anterior muscle
Starting date	January 2015
Contact information	Aline M.A Fruhauf University Nove de Julho São Paulo, SP, Brazil
Notes	

NCT02393651

Study name	Late LTP-like plasticity effects of tDCS in subacute stroke patients
Methods	RCT with parallel-group design
Participants	Estimated enrolment: 48 Inclusion criteria: age 18 to 79 years; single ischaemic stroke, documented by a neurologist; subacute stroke within 1 to 3 weeks poststroke; acute hemiparesis with Fugl-Meyer Stage < IV Exclusion criteria: absence of MEPs; absence of voluntarily movement (Fugl-Meyer Stage < III); head injury or metal in the head; history of cranial irradiation; history of epilepsy; pacemaker; anticonvulsant or neuroleptic medication; substance abuse; inability to understand instructions history of psychiatric disorders
Interventions	2 arms: 1. dual-tDCS plus motor training of the affected upper extremity

NCT02393651 *(Continued)*

	2. sham tDCS plus motor training of the affected upper extremity
Outcomes	Primary outcome measure 1. Change in UE-FM (at 1 week, 2 weeks; 4 weeks and 12 weeks) Secondary outcome measures 1. ARAT (at 1 week, 2 weeks; 4 weeks and 12 weeks) 2. Hand grip strength (at 1 week, 2 weeks; 4 weeks and 12 weeks) 3. 10MWT (at 1 week, 2 weeks; 4 weeks and 12 weeks) 4. EuroQoL-5D (at 12 weeks) 5. BI (at 1 week, 2 weeks; 4 weeks and 12 weeks) 6. HADS (at 4 and 12 weeks) 7. MoCA (at 4 and 12 weeks) 8. Wong-Baker FACES Pain Rating Scale (every stimulation session)
Starting date	March 2015
Contact information	Rick van der Vliet, MSc Rijndam Rotterdam, Zuid-Holland, Netherlands, 3015LJ
Notes	

NCT02398344

Study name	tDCS immediate effect on cardiorespiratory parameters in hemiparetic adult patients due to stroke
Methods	Crossover RCT
Participants	Stroke
Interventions	2 arms: 1. tDCS active 2. sham tDCS
Outcomes	Cardiac Frequency Variability
Starting date	2014
Contact information	University of Nove de Julho, São Paulo, Brazil
Notes	

NCT02399540

Study name	Late LTP-like plasticity effects of tDCS in chronic stroke patients

NCT02399540 *(Continued)*

Methods	RCT with parallel-group design
Participants	Estimated enrolment: 80 Inclusion criteria: aged 18 to 79 years; stroke onset > 6 months prior to enrolment; motor deficit in the upper limb due to the stroke Exclusion criteria: absence of MEPs; absence of voluntarily movement (Fugl-Meyer Stage < III); head injury or metal in the head; history of cranial irradiation; history of epilepsy; pacemaker; anticonvulsant or neuroleptic medication; substance abuse; inability to understand instructions; history of psychiatric disorders
Interventions	4 arms: 1. Day 1: sham tDCS; Day 2: sham tDCS 2. Day 1: sham tDCS; Day 2: conventional paired tDCS 3. Day 1: conventional unpaired tDCS; Day 2: sham tDCS 4. Day 1: late LTP-like plasticity tDCS; Day 2: sham tDCS
Outcomes	Primary outcome measures 1. Motor skill retention (at day 9) Secondary outcome measures 1. Maximum grip force (at day 1 and at day 9) 2. PPT (at day 1 and at day 9)
Starting date	March 2015
Contact information	Contact: Rick van der Vliet, MSc Rijndam Rotterdam, Zuid-Holland, Netherlands, 3015LJ
Notes	

NCT02401724

Study name	A randomised trial of non-invasive brain stimulation (NIBS) in stroke survivors
Methods	RCT with parallel-group design
Participants	Estimated enrolment: 60 Inclusion criteria: aged between 18 and 90 years; ischaemic stroke affecting right hemisphere, radiologically confirmed; persistent neglect > 1 months after stroke, confirmed by BIT; prestroke functional independence (mRS 0 to 2) Exclusion criteria: patients who do not understand English; bilateral infarcts, radiologically confirmed; MoCA < 26; other neurological diseases; significant morbidity; alcohol excess; exclusion criteria for tDCS
Interventions	4 arms: 1. training exercises (lifting rods) 2. active tDCS over the left/undamaged hemisphere (1 mA for 15 minutes) for 10 sessions in 3 weeks

NCT02401724 *(Continued)*

	3. training exercises (lifting rods) plus active tDCS over the left/undamaged hemisphere (1 mA for 15 minutes) for 10 sessions in 3 weeks 4. control training (reaching rods with the unaffected hand)
Outcomes	Primary outcome measure 1. Change in BIT (at 6 months after the end of intervention) Secondary outcome measures: 1. Compliance as measured by adherence to task instructions (at baseline, at 3 weeks and at 6 months) 2. Retention numbers (at baseline, at 3 weeks and at 6 months)
Starting date	March 2015
Contact information	Monika Harvey, BSc (Hons), MSc, PhD NHS Greater Glasgow and Clyde
Notes	

NCT02416791

Study name	Robotic therapy and transcranial direct current stimulation in patients with stroke
Methods	RCT with parallel-group design
Participants	Estimated enrolment: 51 Inclusion criteria: stroke onset 3 to 9 weeks prior to enrolment, radiologically confirmed; UE-FM between 7 and 38; ability to provide informed consent; ability to comply with the schedule of interventions and evaluation of the protocol Exclusion criteria: MAS > 3 in the paretic arm; upper limb plegia; uncontrolled medical conditions; pregnancy; seizures; pacemakers; other neurological disorders; psychiatric illnesses; aphasia compromising comprehension of the experimental protocol; MMSE < 23 for patients with > 1 year of education and MMSE < 19 for patients with > 1 year of education; hemineglect
Interventions	3 arms: 1. C-tDCS over M1 of the affected hemisphere (1 mA for 20 minutes) prior to robotic training with the MIT-Manus, followed by physical therapy for 40 minutes 3 times a week for 6 weeks 2. sham tDCS over M1 of the affected hemisphere prior to robotic training with the MIT-Manus, followed by physical therapy for 40 minutes 3 times a week for 6 weeks 3. sham tDCS over M1 of the affected hemisphere prior to physical therapy for 40 minutes, followed by occupational therapy for 40 minutes 3 times a week for 6 weeks
Outcomes	Primary outcome measures 1. Change in UE-FM (at 6 weeks) 2. Adverse events (at 6 weeks) Secondary outcome measures 1. mRS (change from baseline to 6 weeks) 2. NIHSS (change from baseline to 6 weeks) 3. SIS (change from baseline to 6 weeks)

NCT02416791 *(Continued)*

	4. MAS (change from baseline to 6 weeks) 5. MAL (change from baseline to 6 weeks) 6. UE-FM (at 6 months) 7. Adverse events (at 6 months) 8. FSS (change from baseline to 6 weeks) 9. Pittsburgh Sleep Quality Index (change from baseline to 6 weeks)
Starting date	June 2015
Contact information	Thais Midori K Tokuno Hospital das Clínicas São Paulo, SP, Brazil, 05403900
Notes	

NCT02422173

Study name	Effects of different montages of transcranial direct current stimulation on the risk of falls and lower limb function for acute stroke patients: a randomised controlled trial
Methods	RCT with parallel-group design
Participants	Estimated enrolment: 60 Inclusion criteria: clinical diagnosis of acute stroke; ability to walk 10 metres independently; high risk of falling Exclusion criteria: severe functional limitations; cognitive impairment
Interventions	4 arms: 1. A-tDCS over the affected hemisphere (2 mA) on 5 consecutive days for 2 weeks 2. C-tDCS over the unaffected hemisphere (2 mA) 3. dual-tDCS with the anode positioned over the affected hemisphere and the cathode over the unaffected hemisphere (2 mA) 4. sham tDCS (2 mA for 30 seconds)
Outcomes	Primary outcome measure 1. Four Square Step Test (change from baseline at 3 months) Secondary outcome measures 1. Occurrence of Falling Index (at week 2, week 4 and week 12) 2. Overall Stability Index (at week 2, week 4 and week 12) 3. Falls Efficacy Scale (at week 2, week 4 and week 12) 4. BBS (at week 2, week 4 and week 12) 5. 6MWT (at week 2, week 4 and week 12) 6. STST (at week 2, week 4 and week 12)
Starting date	January 2015
Contact information	Suellen Marinho Andrade

NCT02422173 *(Continued)*

	Federal University of Paraíba
Notes	

NCT02455427

Study name	Safety of transcranial direct current stimulation in the subacute phase after stroke
Methods	RCT with parallel-group design
Participants	Estimated enrolment: 40 Inclusion criteria: age between 18 and 80 years; ischaemic stroke, radiologically confirmed; onset between 72 hours and 6 weeks prior to enrolment; unilateral paresis of upper limb; NIHSS between 5 and 15; NIHSS score of at least 1 point in items 5a or 5b; written informed consent Exclusion criteria: lesions affecting the corticomotor pathway in the hemisphere contralateral to the stroke; use of neuroleptics or other psychoactive drugs; except antidepressants; advanced systemic diseases; other neurologic diseases except migraine; mRS < 2 prior to stroke; advanced systemic diseases; uncontrolled medical conditions; contraindications for physical therapy; pregnancy; absolute or relative contraindications for tDCS
Interventions	2 arms: 1. A-tDCS over M1 of the affected hemisphere (for 20 minutes) followed by 60 minutes of physical therapy 3 times a week for 2 weeks 2. sham tDCS (for 20 minutes) followed by 60 minutes of physical therapy 3 times a week for 2 weeks
Outcomes	Primary outcome measures 1. Frequency of adverse events at 2 weeks Secondary outcome measures 1. Change in mRS at 2 and 14 weeks 2. Change in NIHSS at 2 and 14 weeks 3. Change in SIS at 2 and 14 weeks 4. Change in UE-FM at 2 and 14 weeks 5. Change in MAS at 2 and 14 weeks 6. Change in MAL at 2 and 14 weeks 7. MoCA at 2 and 14 weeks 8. Structural connectivity (measured by DTI) at 2 weeks 9. Functional connectivity (measured by resting-state fMRI) at 2 weeks 10. Change in BI at 2 and 14 weeks 11. Frequency of adverse events at 14 weeks
Starting date	May 2015
Contact information	Adriana B Conforto, MD Phd Hospital Israelita Albert Einstein Brazil
Notes	

NCT02512289

Study name	Impact of non-invasive brain stimulation, associated with upper limb robot-assisted therapy, on motor recuperation
Methods	Crossover RCT
Participants	Stroke
Interventions	2 arms: 1. tDCS and robot-assisted therapy (REAplan) 2. sham tDCS and robot-assisted therapy (REAplan)
Outcomes	Primary outcome 1. Upper Limb Kinematics Secondary outcomes 1. Box and Block test 2. Purdue Pegboard Test
Starting date	2014
Contact information	Cliniques universitaires Saint-Luc- Université Catholique de Louvain
Notes	

NCT02610387

Study name	The effects of tDCS combined with balance training on lower limbs spasticity in chronic stroke patients
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. tDCS 2. sham tDCS
Outcomes	Modified Ashworth Scale
Starting date	2016
Contact information	Fariba Yadolahi, Shahid Beheshti University of Medical Sciences
Notes	

NCT02725853

Study name	Enhancing recovery of arm movement in stroke patients (ENHANCE)
Methods	RCT
Participants	Stroke
Interventions	3 arms: 1. tDCS + personalized practice 2. tDCS + non-personalized practice 3. sham tDCS + personalized practice
Outcomes	Change in active control zone of the elbow
Starting date	2016
Contact information	Mindy F Levin, McGill University
Notes	

NCT02731508

Study name	Repetitive bihemispheric transcranial direct current stimulation after stroke
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. bihemispheric transcranial direct current stimulation 2. sham bihemispheric transcranial direct current stimulation
Outcomes	1. FMA 2. ARAT
Starting date	2015
Contact information	Taipei Veterans General Hospital, Taiwan
Notes	

NCT02806856

Study name	tDCS in acute stroke patients (tDCS)
Methods	RCT
Participants	Stroke Inclusion criteria: 1. age ≥ 18 years

NCT02806856 *(Continued)*

	2. middle cerebral artery stroke confirmed by MRI 3. neuroradiology: initial MRI with diffusion and perfusion sequences 4. NIHSS scale between 4 and 25 5. delay since the beginning of symptoms < 4h30 6. intravenous thrombolysis treatment 7. obtained consent 8. patient affiliated or benefiting from the French national insurance Exclusion criteria: 1. pregnant woman 2. contraindications for an MRI scan: heart pace-maker, patients who have a metallic foreign body (metal sliver) in their eye or in their brain. 3. contraindications for the tDCS: scalp or forehead cutaneous lesion, history of intra-cranial surgery 4. coma 5. beginning of the symptoms cannot be precisely specified
Interventions	2 arms: 1. active tDCS 2. sham tDCS
Outcomes	Primary outcome measure 1. Brain MRI diffusion weighted images
Starting date	2017
Contact information	Martine Gavarat 00 33 6 08 21 04 22 martine.gavaret@parisdescartes.fr Marie Godard 00 33 1 45 65 77 28 marie.godard@aphp.fr
Notes	

NCT02817867

Study name	Association between brain stimulations for the rehabilitation of chronic stroke patients
Methods	RCT
Participants	Stroke
Interventions	3 arms: 1. tDCS 2. TMS 3. tDCS + TMS
Outcomes	Primary outcome measure 1. WMFT
Starting date	2016
Contact information	Federal University of Health Sciences of Porto Alegre Porto Alegre, Rio Grande Do Sul, Brazil

NCT02817867 *(Continued)*

Notes	

NCT02821884

Study name	Combine transcranial direct current stimulation and neuromuscular electrical stimulation on stroke patients
Methods	RCT
Participants	Stroke Inclusion criteria: 1. signed the informed consent 2. first-ever ischemic stroke 3. stroke at least 6 months 4. unilateral hemiplegia 5. no severe cognitive impairment (National Institutes of Health Stroke Scale-Level of Consciousness: 0, Level of Consciousness Questions: 0, Level of Consciousness Commands: 0) 6. sit on a chair for more than 30 minutes independently 7. Brunnstrom recovery stage ≥ 3 in the paretic hand 8. muscle tone at the wrist flexor with a modified Ashworth scale ≤ 2
Interventions	3 arms: 1. tDCS and NMES 2. tDCS and sham NMES 3. sham tDCS and sham NMES
Outcomes	Primary outcome measure 1. Movement performance assessment
Starting date	2017
Contact information	Jau-Hong Lin, Professor, Professor in Department of Physical Therapy, Kaohsiung Medical University, Taiwan, Kaohsiung Medical University Chung-Ho Memorial Hospital
Notes	

NCT02827864

Study name	Efficacy and time dependent effects of tDCS combined with MT for rehabilitation after subacute and chronic stroke
Methods	RCT
Participants	Stroke Inclusion criteria: 1. experienced a first-ever unilateral stroke with stroke onset ≥ 1 week;

NCT02827864 *(Continued)*

	2. UE-FMA score between 18 and 56 3. able to follow instructions to perform the tasks (Mini Mental State Examination ≥ 24)
Interventions	3 arms: 1. sequentially apply tDCS and mirror therapy 2. apply tDCS concurrently 3. mirror therapy with sham tDCS
Outcomes	FMA
Starting date	2016
Contact information	Ching-Yi Wu Chang Gung Memorial Hospital Songshan, Taipei, Taiwan, 105
Notes	

NCT02892084

Study name	Augmentation of locomotor adaptation post-stroke
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. tDCS (walking on an inclined treadmill, while receiving either tDCS or sham tDCS) 2. sham tDCS
Outcomes	Primary outcome 1. Center of Mass Acceleration Peak
Starting date	2013
Contact information	Mark G Bowden, PhD, PTfRalph H. Johnson VA Medical Center
Notes	

NCT02892097

Study name	Transcranial direct current stimulation (tDCS) and task-specific practice for post-stroke neglect
Methods	RCT
Participants	Stroke
Interventions	3 arms:

NCT02892097 *(Continued)*

	1. parietal tDCS plus repetitive task-specific practice 2. primary motor cortex tDCS plus task-specific practice 3. sham tDCS plus task-specific practice
Outcomes	Primary outcome measure 1. Change in excitability of fronto-parietal connectivity
Starting date	2016
Contact information	Emily Grattan, 843-792-3435 grattan@musc.edu Michelle Woodbury 843-792-1671 woodbuml@musc.edu
Notes	

NCT02915185

Study name	Brain stimulation and tailored interventions to promote recovery in stroke survivors
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. strength training with real tDCS 2. strength training with sham tDCS
Outcomes	Primary outcome measures 1. Change in FMA 2. Change in peak-to-peak motor evoked potential amplitude and motor threshold elicited by transcranial magnetic stimulation
Starting date	2017
Contact information	Marie-Helene Boudrias, PhD 514-398-5457 mh.boudrias@mcgill.ca Stephania Palimeris, BSc stephania.palimeris@mail.mcgill.ca
Notes	

NCT02920333

Study name	Efficacy of the non-invasive brain stimulation techniques for lower limb recovery in stroke patients
Methods	RCT
Participants	Stroke
Interventions	3 arms: 1. tDC + rehabilitation training

NCT02920333 *(Continued)*

	2. rTMS rehabilitation training 3. sham tDCS + rehabilitation training
Outcomes	Primary outcome measure 1. Changes of 'gait parameters'
Starting date	2016
Contact information	Effie Chew, MD, National University Hospital, Singapore
Notes	

NCT02960009

Study name	Motor excitability study of high definition transcranial direct current stimulation (HD-tDCS) in chronic stroke
Methods	RCT
Participants	Stroke
Interventions	3 arms: 1. anodal high definition tDCS 2. cathodal high definition tDCS 3. sham HD-tDCS
Outcomes	Primary outcome measures 1. Electroencephalography and Electromyography 2. ARAT
Starting date	2016
Contact information	Raymond KY Tong, Professor, Chinese University of Hong Kong
Notes	

NCT02987361

Study name	Effect of tDCS on upper extremity after strokes
Methods	RCT
Participants	Stroke
Interventions	4 arms: 1. A-tDCS 2. C-tDCS 3. dual-tDCS 4. sham tDCS

NCT02987361 *(Continued)*

Outcomes	Primary outcome 1. FMA
Starting date	2016
Contact information	Kim Yeon Hee, Seoul City, Ilwon, Republic of Korea, Contact: AH HE LEE, MS 82-2-6007-5408 ahee.lee@gmail.com
Notes	

NCT03026712

Study name	Hemiparetic arm robotic mobilization with non invasive electrical stimulation (hAR-Monies)
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. A-tDCS 2. sham-tDCS
Outcomes	FMA
Starting date	2016
Contact information	Stefano Paolucci, RCCS Fondazione Santa Lucia, Roma
Notes	

NCT03092570

Study name	Manual dexterity control after cerebellar stimulation (MADECCS)
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. tDCS 2. sham tDCS
Outcomes	Primary outcome measures 1. Force control of the force applied by each finger 2. Overflow in ms of the involuntary finger movements
Starting date	2017

NCT03092570 *(Continued)*

Contact information	Marion Verneau, PhD, +33140788663, mverneau@gmail.com Marie Godard, +33 1 45 65 77 28, marie.godard@aphp.fr
Notes	

NCT03093142

Study name	The treatment effectiveness of combined tDCs and neurofeedback (NF) for patients with cognitive deficits after stroke
Methods	RCT
Participants	Stroke
Interventions	3 arms: 1. tDCS + neurofeedback 2. real neurofeedback 3. sham neurofeedback
Outcomes	Change score in Trail Making Test A & B
Starting date	2017
Contact information	Marko Chan, MSc, 31297131, ckl892@ha.org.hk
Notes	

NCT03122821

Study name	Transcranial brain stimulation for stroke rehabilitation
Methods	RCT
Participants	Stroke
Interventions	4 arms 1. tDCS 2. TMS 3. tDCS + mental imagery 4. TMS + mental imagery
Outcomes	Primary outcome measure 1. Action arm inventory for stroke
Starting date	2017
Contact information	Faizan Z Kashoo, MastersMajmaah University, King Khalid Hospital, Al Majma'ah, Riyadh, Saudi Arabia, 11952

NCT03122821 *(Continued)*

Notes	

NCT03124147

Study name	Optimizing transcranial direct current stimulation for motor recovery from hemiparesis
Methods	RCT
Participants	Stroke
Interventions	4 arms: 1. A- tDCS with motor training 2. C- tDCS with motor training 3. dual- tDCS with motor training 4. sham- tDCS with motor training
Outcomes	FMA
Starting date	20111
Contact information	Lumy Sawaki, Associate Professor, University of Kentucky
Notes	

NCT03144102

Study name	Combining tDCS with VR-based motor training in stroke
Methods	RCT
Participants	Stroke
Interventions	4 arms: 1. virtual reality-based therapy + A-tDCS 2. occupational therapy + A-tDCS 3. virtual reality-based therapy + sham tDCS 4. occupational therapy + sham tDCS
Outcomes	FMA
Starting date	2017
Contact information	Paul Verschure, 0034935422202, paul.verschure@upf.edu Belén Rubio, PhD, 0034935422202, belen.rubio@upf.edu
Notes	

NCT03230695

Study name	Robotic therapy and brain stimulation in the early phase after stroke
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. tDCS + robotic therapy 2. sham tDCS + robotic therapy
Outcomes	Movement smoothness
Starting date	2017
Contact information	Suzana B Reis, OT, 551126617955, suzana.reis@usp.br
Notes	

NCT03317860

Study name	Improving measurement and treatment of post-stroke neglect
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. sham tDCS + repetitive task-specific practice 2. tDCS + repetitive task-specific practice
Outcomes	Change in excitability of fronto-parietal connectivity
Starting date	2018
Contact information	Emily S Grattan, PhD OTR MS, 843-792-3435, grattan@musc.edu
Notes	

NCT03342534

Study name	Improving measurement and treatment of post-stroke neglect
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. tDCS + repetitive task-specific practice 2. sham tDCS + repetitive task-specific practice

NCT03342534 *(Continued)*

Outcomes	Change in excitability of fronto-parietal connectivity
Starting date	2017-2018
Contact information	Emily S Grattan, PhD OTR MS, (843) 792-3435, grattan@musc.edu Michelle L Woodbury, PhD, (834) 792-1671, WoodbuML@musc.edu
Notes	

NCT03390192

Study name	Noninvasive dual-mode stimulation therapy for neurorehabilitation in stroke
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. active rTMS and active tDCS 2. active rTMS and sham tDCS
Outcomes	FMA
Starting date	2015
Contact information	
Notes	

NCT03446378

Study name	tDCS on motor rehabiliation of post stroke patients
Methods	RCT
Participants	Stroke
Interventions	3 arms: 1. A- tDCS + physical therapy 2. C- tDCS + physical therapy 3. sham tDCS + physical therapy
Outcomes	FMA
Starting date	2018
Contact information	Kátia Monte-Silva, Principal investigator, Universidade Federal de Pernambuco
Notes	

NCT03452254

Study name	NIBS with mCIMT for motor and functional upper limb recovery in stroke patients
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. bihemispheric tDCS 2. sham bihemispheric tDCS
Outcomes	Upper limb motor recovery
Starting date	2018
Contact information	Fabrizio Acevedo, +56962463187, fabrizio.acevedo@gmail.com
Notes	

NCT03460886

Study name	Most effective stimulation site in transcranial direct current stimulation for gait recovery after stroke
Methods	RCT
Participants	Stroke
Interventions	4 arms: 1. bihemispheric stimulation 2. ipsilesional stimulation A-tDCS 3. contralesional stimulation A-tDCS 4. sham
Outcomes	Changes in motor-evoked potential
Starting date	2018
Contact information	Samsung Medical CenterSeoul, Republic of Korea
Notes	

NCT03465631

Study name	Upper extremity rehabilitation using SMART Glove system with transcranial direct current stimulation
Methods	RCT

NCT03465631 *(Continued)*

Participants	Stroke
Interventions	2 arms: 1. SMART Glove system with tDCS combined bilateral tDCS and VR-based therapy on distal upper extremity training 2. SMART Glove system with sham-tDCS combined bilateral tDCS and VR-based therapy on distal upper extremity training
Outcomes	Box and block test
Starting date	2018
Contact information	Joon-Ho Shin, MS82-2-901-1884, asfreelyas@gmail.com
Notes	

NCT03492229

Study name	Cortical priming to optimize gait rehabilitation post stroke
Methods	RCT
Participants	Stroke
Interventions	4 arms: 1. tDCS + ankle motor training 2. tDCS only before treadmill training 3. ankle motor training only before treadmill training 4. no priming before treadmill training
Outcomes	Change in gait speed using 10 meter walk test
Starting date	2014
Contact information	Sangeetha Madhavan, Associate Professor, University of Illinois at Chicago
Notes	

NCT03528018

Study name	Efficacy of a combined transcranial direct current stimulation and virtual reality intervention (RE-ACT01)
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. combined tDCS and virtual reality-based intervention

NCT03528018 *(Continued)*

	2. conventional physical therapy
Outcomes	FMA
Starting date	2015
Contact information	Roberto Llorens, PhD, Universitat Politècnica de València
Notes	

NCT03562663

Study name	Brain stimulation and robotics in chronic stroke motor recovery
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. tDCS 2. sham tDCS
Outcomes	FMA
Starting date	2018
Contact information	Kathleen Friel, PhD, Burke Medical Research Institute
Notes	

NCT03574038

Study name	Transcranial direct current stimulation as a neuroprotection in acute stroke (TESSERACT)
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. tDCS 2. sham tDCS
Outcomes	Rate of symptomatic intracranial hemorrhage (SICH) in the active treatment arm compared to sham arm, and between higher and lower dose tiers
Starting date	2018
Contact information	Mersedeh Bahr Hosseini, MD, University of California, Los Angeles
Notes	

NCT03708016

Study name	Effect of robot gait training with brain stimulation on gait function in stroke patients
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. robot gait training with A-tDCS 2. robot gait training without tDCS
Outcomes	Change in 10 meter walk test from baseline in gait speed
Starting date	2018
Contact information	Yun-Hee Kim, MD, PhD, 82-2-3410-2824, yun1225.kim@samsung.com
Notes	

NTR3315

Study name	The effect of noninvasive brain stimulation on lower limb motor skill acquisition
Methods	Randomised controlled double-blind trial with parallel assignment
Participants	60 participants 18 years of age or older with hemiparesis due to a first-time ever ischaemic subcortical stroke at least 6 months before study enrolment, good vision on 2 metre distance, being able to stand and to make stepping movements for 42 minutes, independent walkers with clear walking impairment Exclusion criteria: metallic implants in the brain, presence of severe or frequent headache, other neurological disorders or orthopaedic problems, history of cardiac conditions that interfere with physical load
Interventions	3 training sessions with 3 different interventions of tDCS during the first 10 minutes of each training session: 1. experimental 1: A-tDCS of M1 2. experimental 2: A-tDCS of cerebellum 3. sham comparator: Sham tDCS
Outcomes	Primary outcome measure 1. Relative change in motor skill between the first and last training blocks (total learning) Secondary outcome measure 1. Change in motor skill during motor skill training (online learning) 2. Change in motor skill between 2 consecutive motor skill training sessions (offline learning)
Starting date	1 March 2012
Contact information	Edwin van Asseldonk, e.h.f.vanasseldonk@utwente.nl

NTR3315 *(Continued)*

Notes	

NTR5261

Study name	Improving standing balance after stroke with tDCS and postural feedback therapy
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. VR-postural feedback therapy in combination with cerebellar tDCS 2. VR-postural feedback therapy alone
Outcomes	Berg Balance Scale
Starting date	Unclear
Contact information	Sarah Zandvliet Postbus 7057, 1007 MB Amsterdam, De boelelaan 1118 (PK-1Y162) s.zandvliet@vumc.nl http://www.trialregister.nl/trialreg/admin/rctview.asp?TC=5261
Notes	

NTR5757

Study name	The offline effects of brain stimulation(transcranial direct current stimulation, tDCS) on postural balance control after stroke.
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. A-tDCS 2. C-tDCS
Outcomes	Reaction time in reaction time tasks and the onset of balance recovery responses
Starting date	Unclear
Contact information	Milou Coppens, milou.coppens@radboudumc.nl
Notes	

NTR5828

Study name	The offline effects of transcranial direct current stimulation (tDCS) on postural balance control after stroke - effects tDCS after stroke
Methods	RCT
Participants	Stroke
Interventions	3 arms: 1. A-tDCS 2. C-tDCS 3. sham tDCS
Outcomes	Reaction time in a simple reaction time task and the onset of postural responses
Starting date	Unclear
Contact information	Milou Coppens, milou.coppens@radboudumc.nl
Notes	

PACTR201803003148269

Study name	Effect of transcranial direct current stimulation combined with constraint-induced movement therapy on cortical reorganization and functional outcome
Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. constraint induced movement therapy and active bilateral transcranial direct current stimulation 2. constraint induced movement therapy and sham bihemispheric transcranial direct current stimulation
Outcomes	1. Ipsilesional and contralesional cortical excitability using motor evoked potentials; 2. Functional abilities of affected upper extremity
Starting date	2018
Contact information	Abd aleem Ateya 7 Ahmed Al-Zayat street, between the sarayat, Dokki aaatteya@gmail.com
Notes	

Paolucci 2017

Study name	Association of dual transcranial electrical stimulation (tDCS) to upper limb robotic therapy in patients with chronic stroke

Paolucci 2017 *(Continued)*

Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. dual tDCS (anodic over lesioned side and cathodic over the healthy) of 1–2 mA of intensity for 20 minutes 2. sham tDCS with same duration
Outcomes	FMA
Starting date	2017
Contact information	Campus Bio-Medico University, Neurology, Roma, Italy
Notes	

Paquette 2013

Study name	Not stated by the authors
Methods	Not clearly stated by the authors
Participants	Estimated enrolment: not stated by the authors Inclusion criteria: not stated by the authors Exclusion criteria: not stated by the authors
Interventions	4 arms: 1. active "inhibitory stimulation" of rTMS over the unaffected M1 (for 15 minutes) followed by active C-tDCS over unaffected M1 during a physiotherapy session (for 40 to 60 minutes) for up to 10 days 2. sham "inhibitory stimulation" of rTMS over the unaffected M1 (for 15 minutes) followed by active C-tDCS over unaffected M1 during a physiotherapy session (for 40 to 60 minutes) for up to 10 days 3. active "inhibitory stimulation" of rTMS over the unaffected M1 (for 15 minutes) followed by sham C-tDCS over unaffected M1 during a physiotherapy session (for 40 to 60 minutes) for up to 10 days 4. sham "inhibitory stimulation" of rTMS over the unaffected M1 (for 15 minutes) followed by sham C-tDCS over unaffected M1 during a physiotherapy session (for 40 to 60 minutes) for up to 10 days
Outcomes	CAHAI
Starting date	Not stated by the authors
Contact information	None known
Notes	Conference abstract only

RBR-22rh3p

Study name	Non-invasive brain stimulation and physical training in stroke patients with motor impairments

RBR-22rh3p *(Continued)*

Methods	RCT
Participants	Stroke
Interventions	2 arms: 1. tDCS 2. sham tDCS
Outcomes	Upper and lower limb maximal strength and endurance
Starting date	2016
Contact information	Laboratório de Atividade Física e Promoção da Saúde - Instituto de Educação Física e Desportos - Universidade do Estado do Rio de Janeiro - Rio de Janeiro, RJ Brazil Laboratório de Pesquisas Clinicas e Experimentais em Biologia Vascular - Rio de Janeiro, RJ Brazil
Notes	

RBR-25xyqp

Study name	The use of transcranial electrical current stimulation and physical therapy exercise for rehabilitation of patients after stroke
Methods	RCT
Participants	Stroke
Interventions	4 arms: 1. conventional physiotherapy treatment and tDCS 2. exercise protocol of weight transfer 3. tDCS 4. conventional physiotherapy along with the exercise protocol and application of tDCS
Outcomes	FMA
Starting date	Unclear
Contact information	Zaira Hanschke Praça das Nações, 34 Sociedade Unificada de Ensino Augusto Motta - Rio de Janeiro, RJ, Brazil zairah.fisio@gmail.com
Notes	

Sattler 2012

Study name	Not stated by the authors
Methods	Study design: randomised double-blind sham-controlled trial (parallel-group design)

Sattler 2012 *(Continued)*

Participants	Estimated enrolment: 20 patients within the first month of a cortical or subcortical stroke
Interventions	2 arms 1. A-tDCS + rEPNS of the radial nerve of the paretic side at 5 consecutive daily sessions 2. sham tDCS + rEPNS of the radial nerve of the paretic side at 5 consecutive daily sessions
Outcomes	1. Motor performance as measured by JTT at baseline, after the intervention period and at 5, 15 and 30 days of follow-up 2. Cortical excitability at baseline
Starting date	Not stated by the authors
Contact information	None known
Notes	Conference abstract only

TCTR20160606003

Study name	Transcranial direct current stimulation modulates EEG signals of brain computer interface in stroke patients: a randomized controlled pilot study
Methods	Unclear
Participants	Stroke
Interventions	Unclear Quote: "10 min of 1 mA tDCS stimulation on primary motor area of hemiparetic side, 30 s of 1 mA tDCS stimulation on primary motor area of hemiparetic side, and remain attach the electrode until 30 min"
Outcomes	Unclear
Starting date	2015
Contact information	Somsakul Boontanom 1873 Department of Rehabilitation Medicine, Chulalongkorn Hospital, Rama 4 Rd, Patumwan Bangkok 10330 somsakul@ymail.com 0894481111 Department of Rehabilitation Medicine, Chulalongkorn University
Notes	

6MWT: Six minute walking test
9-HPT: Nine-Hole Peg Test
10MWT: 10-Meter Walk Test
A-tDCS: anodal transcranial direct current stimulation
AAP: Adelaide Activities Profile
AMES: Assisted Motion with Enhanced Sensation device
ARAT: Action Research Arm Test
BBS: Berg Balance Scale
BBT: Box and Block Test
BDI: Beck Depression Inventory

BI: Barthel Index
BIT: Behavioural Inattention Test
BTN: Negligence Battery Test
C-tDCS: cathodal transcranial direct current stimulation
CIMT: constraint-induced movement therapy
CMSA: Chedoke-McMaster Stroke Assessment
CNS: central nervous system
COP: centre of pressure
DTI: Diffusion Tensor Imaging
EEG: electroencephalography
EMG: electromyography
FBCSP: Filter Bank Common Spatial Pattern
FIM: Functional Independence Measure
FMA: Fugl-Meyer Assessment
fMRI: functional magnetic resonance imaging
FSS: Fatigue Severity Scale
GABA: gamma-aminobutyric acid
ITT: intention-to-treat
JTT: Jebsen Taylor Hand Function Test
M1: primary motor cortex
mA: milliampere
MEP: motor-evoked potentials
MAL: Motor Activity Log
MAS: Motor Assessment Scale
MCA: middle cerebral artery
mCIMT: modified constraint-induced movement therapy
MI-BCI: motor imagery brain-computer interface
MoCA: Montreal Cognitive Assessment
MMSE: Mini Mental State Examination
MRC: Medical Research Council
MRI: magnetic resonance imaging
NIHSS: National Institutes of Health Stroke Scale
NMDA: *N*-methyl-D-aspartate
NMES: neuromuscular electrical stimulation
OT: occupational therapy
PPT: Purdue Pegboard Test
RCT: randomised controlled trial
ROM: range of motion
RMAB: Rivermead Motor Assessment Battery
rEPNS: repetitive peripheral nerve stimulation
rNSA: revised Nottingham Sensory Assessment
rTMS: repetitive transcranial magnet stimulation
SAH: subarachnoidal haemorrhage
SIS: Stroke Impact Scale
SS-QOL: Stroke Specific Quality of Life
STST: Sit to Stand Test
TBI: traumatic brain injury
TCT: Trunk Control Test
tDCS: transcranial direct current stimulation
TMS: transcranial magnetic stimulation
TUG: Timed Up and Go Test
UBS: Unified Balance Scale
UE-FM: Upper Extremity Fugl-Meyer
VAS: Visual Analogue Scale
VR: virtual reality
WMFT: Wolf Motor Function Test

DATA AND ANALYSES

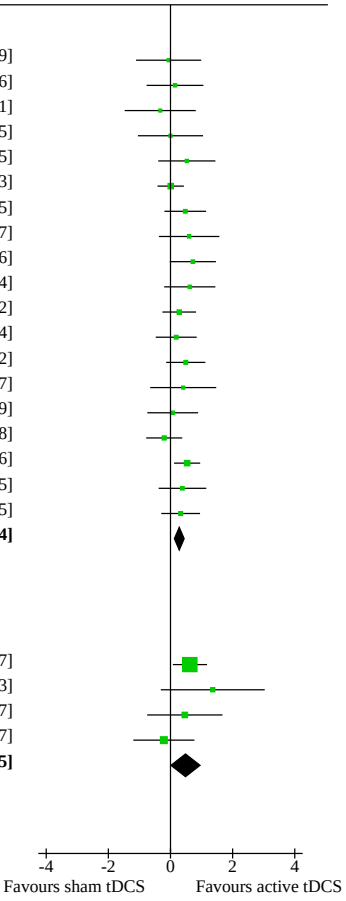
Comparison 1. tDCS versus any type of placebo or passive control intervention

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.1 Primary outcome measure: ADL at the end of the intervention period	23		Std. Mean Difference (IV, Random, 95% CI)	Subtotals only
1.1.1 Absolute values	19	686	Std. Mean Difference (IV, Random, 95% CI)	0.28 [0.13, 0.44]
1.1.2 Change scores	4	95	Std. Mean Difference (IV, Random, 95% CI)	0.48 [0.02, 0.95]
1.2 Primary outcome measure: ADL until the end of follow-up	7		Std. Mean Difference (IV, Random, 95% CI)	Subtotals only
1.2.1 Absolute values	6	269	Std. Mean Difference (IV, Random, 95% CI)	0.31 [0.01, 0.62]
1.2.2 Change scores	1	16	Std. Mean Difference (IV, Random, 95% CI)	-0.64 [-1.66, 0.37]
1.3 Secondary outcome measure: upper extremity function at the end of the intervention period	34		Std. Mean Difference (IV, Random, 95% CI)	Subtotals only
1.3.1 Absolute values	24	792	Std. Mean Difference (IV, Random, 95% CI)	0.17 [-0.05, 0.38]
1.3.2 Change scores	10	193	Std. Mean Difference (IV, Random, 95% CI)	0.33 [-0.12, 0.79]
1.4 Secondary outcome measure: upper extremity function to the end of follow-up	8		Std. Mean Difference (IV, Random, 95% CI)	Subtotals only
1.4.1 Absolute values	5	211	Std. Mean Difference (IV, Random, 95% CI)	-0.00 [-0.39, 0.39]
1.4.2 Change scores	3	72	Std. Mean Difference (IV, Random, 95% CI)	1.07 [0.04, 2.11]
1.5 Secondary outcome measure: lower extremity function at the end of the intervention period	12		Std. Mean Difference (IV, Random, 95% CI)	Subtotals only
1.5.1 Absolute values	8	204	Std. Mean Difference (IV, Random, 95% CI)	0.28 [-0.12, 0.69]
1.5.2 Change scores	4	54	Std. Mean Difference (IV, Random, 95% CI)	0.46 [-0.09, 1.01]
1.6 Secondary outcome measure: muscle strength at the end of the intervention period	18		Std. Mean Difference (IV, Random, 95% CI)	Subtotals only
1.6.1 Absolute values	13	437	Std. Mean Difference (IV, Random, 95% CI)	0.19 [-0.01, 0.38]

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.6.2 Change values	5	116	Std. Mean Difference (IV, Random, 95% CI)	0.07 [-0.66, 0.80]
1.7 Secondary outcome measure: muscle strength at the end of follow-up	3	156	Std. Mean Difference (IV, Random, 95% CI)	0.07 [-0.26, 0.41]
1.8 Secondary outcome measure: cognitive abilities at the end of the intervention period	2	56	Std. Mean Difference (IV, Random, 95% CI)	0.46 [-0.10, 1.02]
1.9 Secondary outcome measure: hemispatial neglect at the end of intervention period	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
1.10 Secondary outcome measure: dropouts, adverse events and deaths during the intervention period	47	1330	Risk Ratio (M-H, Random, 95% CI)	1.25 [0.74, 2.13]

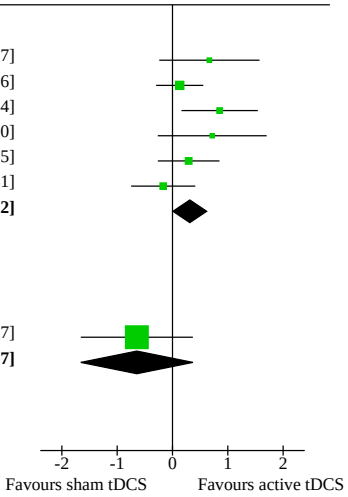
Analysis 1.1. Comparison 1: tDCS versus any type of placebo or passive control intervention, Outcome 1: Primary outcome measure: ADL at the end of the intervention period

Study or Subgroup	Active tDCS Mean	SD	Total	Sham tDCS Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
1.1.1 Absolute values								
Bolognini 2011	2.3	3.6	7	2.5	2.6	7	2.2%	-0.06 [-1.11 , 0.99]
Chelette 2014	65.1	25.5	20	61.5	16.9	6	3.0%	0.15 [-0.77 , 1.06]
Cunningham 2015	2	1.3	6	2.4	0.9	6	1.9%	-0.33 [-1.47 , 0.81]
Di Lazzaro 2014a	-3	1	7	-3	1.3	7	2.2%	0.00 [-1.05 , 1.05]
Di Lazzaro 2014b	-2.4	1.17	10	-3.1	1.38	9	2.9%	0.53 [-0.39 , 1.45]
Hesse 2011	56.4	13.5	64	56.3	15.5	32	13.7%	0.01 [-0.42 , 0.43]
Khedr 2013	52	24.5	27	41	18	13	5.5%	0.48 [-0.19 , 1.15]
Kim 2010	86.1	14.4	11	71	34.4	7	2.6%	0.60 [-0.37 , 1.57]
Kim 2016	79.6	11.3	15	68.3	18.4	15	4.5%	0.72 [-0.02 , 1.46]
Koo 2018	65.3	13	12	55.2	18	12	3.6%	0.62 [-0.20 , 1.44]
Lee 2014	69.9	16.6	39	64.3	24.5	20	8.4%	0.28 [-0.26 , 0.82]
Nicolo 2017	0.3	0.5	28	0.2	0.6	13	5.7%	0.18 [-0.48 , 0.84]
Qu 2017	61	10	30	56	10	15	6.2%	0.49 [-0.14 , 1.12]
Rocha 2016	3.25	0.8	7	2.9	0.8	7	2.2%	0.41 [-0.65 , 1.47]
Straudi 2016	1	1.3	12	0.9	1.4	11	3.7%	0.07 [-0.75 , 0.89]
Tedesco Triccas 2015b	1.2	2.1	22	1.6	1.8	24	7.3%	-0.20 [-0.78 , 0.38]
Wu 2013a	76.2	19.6	45	65.4	20.4	45	13.9%	0.54 [0.11 , 0.96]
Yi 2016	44.1	20.4	20	36.8	13.3	10	4.2%	0.39 [-0.38 , 1.15]
Yun 2015	71.8	21.7	30	64.4	23.2	15	6.3%	0.33 [-0.30 , 0.95]
Subtotal (95% CI)			**412**			**274**	**100.0%**	**0.28 [0.13 , 0.44]**
Heterogeneity: Tau² = 0.00; Chi² = 11.45, df = 18 (P = 0.87); I² = 0%								
Test for overall effect: Z = 3.53 (P = 0.0004)								
1.1.2 Change scores								
Andrade 2017	43.5	17.9	40	33	13.4	20	57.3%	0.63 [0.08 , 1.17]
Danzl 2012	11	6	4	4	2	4	7.6%	1.36 [-0.31 , 3.03]
Fusco 2014	26	21	5	18	10	6	14.2%	0.46 [-0.75 , 1.67]
Rabadi 2017	22.4	15.7	8	25.3	9.1	8	20.9%	-0.21 [-1.20 , 0.77]
Subtotal (95% CI)			**57**			**38**	**100.0%**	**0.48 [0.02 , 0.95]**
Heterogeneity: Tau² = 0.02; Chi² = 3.24, df = 3 (P = 0.36); I² = 8%								
Test for overall effect: Z = 2.02 (P = 0.04)								



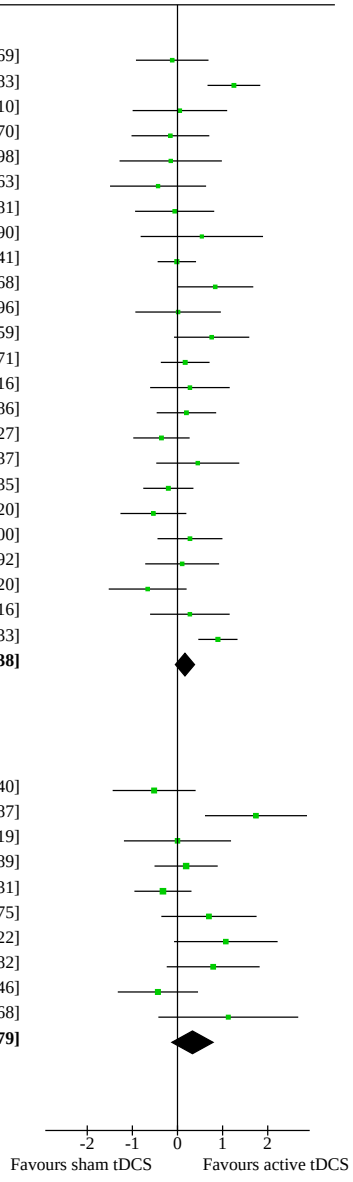
Analysis 1.2. Comparison 1: tDCS versus any type of placebo or passive control intervention, Outcome 2: Primary outcome measure: ADL until the end of follow-up

Study or Subgroup	Active tDCS Mean	SD	Total	Sham tDCS Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
1.2.1 Absolute values								
Di Lazzaro 2014b	-0.4	0.9	10	-1.1	1.1	10	9.6%	0.67 [-0.24 , 1.57]
Hesse 2011	68	18	63	65.5	20.7	32	28.0%	0.13 [-0.29 , 0.56]
Khedr 2013	70	23.4	27	51	18	13	14.8%	0.85 [0.16 , 1.54]
Kim 2010	85.8	16	11	73	18.5	7	8.3%	0.72 [-0.27 , 1.70]
Rossi 2013	70.6	15.8	25	65.2	20.3	25	20.2%	0.29 [-0.27 , 0.85]
Tedesco Triccas 2015b	1.4	1.7	22	1.7	1.8	24	19.1%	-0.17 [-0.75 , 0.41]
Subtotal (95% CI)			**158**			**111**	**100.0%**	**0.31 [0.01 , 0.62]**
Heterogeneity: Tau² = 0.04; Chi² = 6.88, df = 5 (P = 0.23); I² = 27%								
Test for overall effect: Z = 2.02 (P = 0.04)								
1.2.2 Change scores								
Rabadi 2017	31.4	18.1	8	42.7	14.9	8	100.0%	-0.64 [-1.66 , 0.37]
Subtotal (95% CI)			**8**			**8**	**100.0%**	**-0.64 [-1.66 , 0.37]**
Heterogeneity: Not applicable								
Test for overall effect: Z = 1.25 (P = 0.21)								
Test for subgroup differences: Chi² = 3.15, df = 1 (P = 0.08), I² = 68.2%								



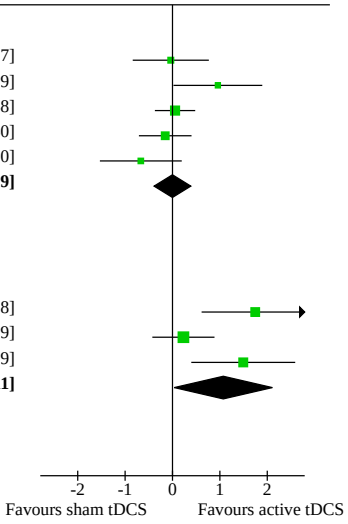
Analysis 1.3. Comparison 1: tDCS versus any type of placebo or passive control intervention, Outcome 3: Secondary outcome measure: upper extremity function at the end of the intervention period

Study or Subgroup	Active tDCS Mean	SD	Total	Sham tDCS Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
1.3.1 Absolute values								
Allman 2016	29.9	21.5	11	32.5	21.5	13	4.0%	-0.12 [-0.92 , 0.69]
Andrade 2017	30.2	5.6	40	23.7	4	20	5.5%	1.25 [0.67 , 1.83]
Bolognini 2011	32	33	7	30	37	7	2.8%	0.05 [-0.99 , 1.10]
Chelette 2014	11.3	12.5	20	13.3	11.9	7	3.7%	-0.16 [-1.02 , 0.70]
Cunningham 2015	47.5	12	6	49.3	10	6	2.5%	-0.15 [-1.28 , 0.98]
Di Lazzaro 2014a	0.21	0.3	7	0.37	0.39	7	2.8%	-0.43 [-1.49 , 0.63]
Di Lazzaro 2014b	0.36	0.29	10	0.38	0.32	10	3.6%	-0.06 [-0.94 , 0.81]
Fusco 2013a	0.3	0.2	5	0.2	0.1	4	1.9%	0.54 [-0.82 , 1.90]
Hesse 2011	19	12.5	63	19.2	15.8	32	6.8%	-0.01 [-0.44 , 0.41]
Ilić 2016	-82	23.2	13	-99	14.2	11	3.8%	0.84 [-0.01 , 1.68]
Kim 2010	49.2	15.8	11	49	10.6	7	3.3%	0.01 [-0.93 , 0.96]
Koo 2018	4.4	1.4	12	3	2.1	12	3.8%	0.76 [-0.08 , 1.59]
Lee 2014	45.4	22.3	39	41.6	21.3	20	5.8%	0.17 [-0.37 , 0.71]
Lindenberg 2010	43.8	13	10	40.2	12	10	3.6%	0.28 [-0.61 , 1.16]
Nicolo 2017	30.3	27.2	28	24.8	27.3	13	4.9%	0.20 [-0.46 , 0.86]
Qu 2017	13	6.4	30	15	3	15	5.2%	-0.36 [-0.98 , 0.27]
Rocha 2016	57.3	4.2	14	54.9	6.7	7	3.4%	0.45 [-0.47 , 1.37]
Rossi 2013	7.5	10.1	25	9.6	10.3	25	5.7%	-0.20 [-0.76 , 0.35]
Salazar 2019	26.7	8	15	31.2	8.4	15	4.4%	-0.53 [-1.26 , 0.20]
Shaheiwola 2018	25.4	9.2	15	22.1	13.6	15	4.5%	0.28 [-0.44 , 1.00]
Straudi 2016	28.5	19	12	26.6	16.1	11	3.9%	0.10 [-0.72 , 0.92]
Tedesco Triccas 2015b	33.6	16.3	11	44.8	16.3	11	3.7%	-0.66 [-1.52 , 0.20]
Viana 2014	50.6	13.4	10	46.9	12.4	10	3.6%	0.27 [-0.61 , 1.16]
Wu 2013a	22.3	7.9	45	14.6	9.1	45	6.7%	0.90 [0.46 , 1.33]
Subtotal (95% CI)			**459**			**333**	**100.0%**	**0.17 [-0.05 , 0.38]**
Heterogeneity: Tau² = 0.12; Chi² = 44.13, df = 23 (P = 0.005); I² = 48%								
Test for overall effect: Z = 1.53 (P = 0.13)								
1.3.2 Change scores								
Ang 2012	0.9	3	10	2.8	4	9	10.8%	-0.52 [-1.44 , 0.40]
D'Agata 2016	3	1.8	8	0.1	1.4	10	8.8%	1.74 [0.61 , 2.87]
Fusco 2014	4	5	5	4	7	6	8.3%	0.00 [-1.19 , 1.19]
Hamoudi 2018	7.5	14.8	18	5	9.4	14	13.2%	0.19 [-0.51 , 0.89]
Mazzoleni 2019	12	8.5	20	15.74	13.75	19	14.0%	-0.32 [-0.95 , 0.31]
Mortensen 2016	29	6	8	23	10	7	9.5%	0.70 [-0.36 , 1.75]
Nair 2011	4.1	2.7	7	1.6	1.5	7	8.7%	1.07 [-0.08 , 2.22]
Rabadi 2017	10.1	13.5	8	1.7	4.4	8	9.7%	0.79 [-0.24 , 1.82]
Sattler 2015	6.6	4.2	10	9	6.2	10	11.1%	-0.43 [-1.32 , 0.46]
Wang 2014	1.4	0.5	6	0.8	0.4	3	6.0%	1.13 [-0.42 , 2.68]
Subtotal (95% CI)			**100**			**93**	**100.0%**	**0.33 [-0.12 , 0.79]**
Heterogeneity: Tau² = 0.28; Chi² = 19.85, df = 9 (P = 0.02); I² = 55%								
Test for overall effect: Z = 1.43 (P = 0.15)								
Test for subgroup differences: Chi² = 0.42, df = 1 (P = 0.52), I² = 0%								



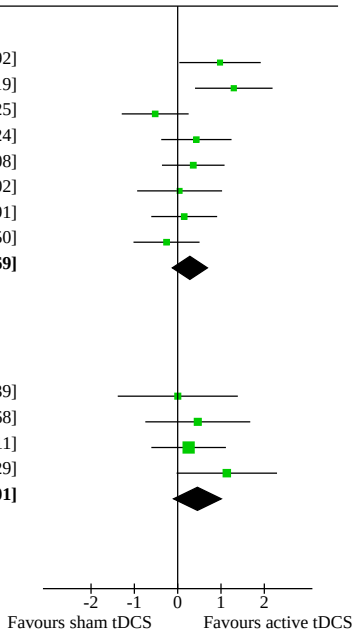
Analysis 1.4. Comparison 1: tDCS versus any type of placebo or passive control intervention, Outcome 4: Secondary outcome measure: upper extremity function to the end of follow-up

Study or Subgroup	Active tDCS Mean	SD	Total	Sham tDCS Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
1.4.1 Absolute values								
Allman 2016	30.5	20.9	11	31.3	21.8	13	16.0%	-0.04 [-0.84 , 0.77]
Di Lazzaro 2014b	0.8	0.1	10	0.7	0.1	10	12.8%	0.96 [0.02 , 1.89]
Hesse 2011	23.4	16.3	63	22.5	17.1	32	31.7%	0.05 [-0.37 , 0.48]
Rossi 2013	13.6	11.2	25	15.2	9.2	25	25.0%	-0.15 [-0.71 , 0.40]
Tedesco Triccas 2015b	32.1	16.7	11	44.2	18.1	11	14.5%	-0.67 [-1.53 , 0.20]
Subtotal (95% CI)			**120**			**91**	**100.0%**	**-0.00 [-0.39 , 0.39]**
Heterogeneity: Tau² = 0.08; Chi² = 6.68, df = 4 (P = 0.15); I² = 40%								
Test for overall effect: Z = 0.00 (P = 1.00)								
1.4.2 Change scores								
D'Agata 2016	3.4	1.8	8	0.1	1.8	10	30.0%	1.75 [0.61 , 2.88]
Hamoudi 2018	17.5	10.6	18	15	10.6	18	39.4%	0.23 [-0.43 , 0.89]
Kim 2010	23.9	13.7	11	2.3	13.9	7	30.7%	1.49 [0.40 , 2.59]
Subtotal (95% CI)			**37**			**35**	**100.0%**	**1.07 [0.04 , 2.11]**
Heterogeneity: Tau² = 0.60; Chi² = 7.12, df = 2 (P = 0.03); I² = 72%								
Test for overall effect: Z = 2.03 (P = 0.04)								
Test for subgroup differences: Chi² = 3.62, df = 1 (P = 0.06), I² = 72.4%								



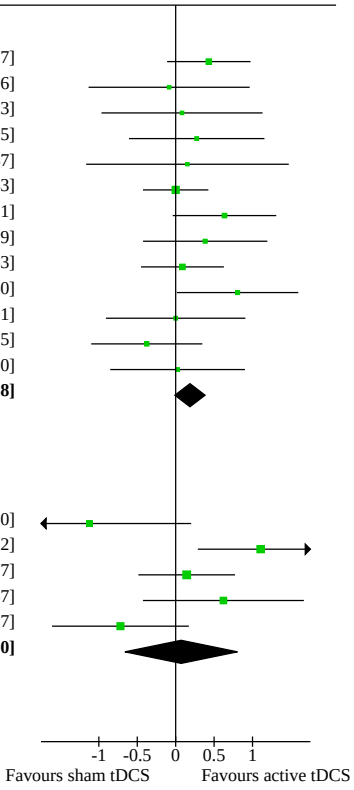
Analysis 1.5. Comparison 1: tDCS versus any type of placebo or passive control intervention, Outcome 5: Secondary outcome measure: lower extremity function at the end of the intervention period

Study or Subgroup	Active tDCS Mean	SD	Total	Sham tDCS Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
1.5.1 Absolute values								
Cha 2014	27.8	3.6	10	22.5	6.4	10	10.8%	0.98 [0.04 , 1.92]
Chang 2015	33.5	0.7	12	31.4	2.1	12	11.5%	1.30 [0.40 , 2.19]
Geroin 2011	16.2	7.65	10	22	12.1	20	13.4%	-0.52 [-1.29 , 0.25]
Koo 2018	1.5	1.3	12	1	0.9	12	12.7%	0.43 [-0.38 , 1.24]
Manji 2018	-14	5.7	15	-16	5.1	15	14.2%	0.36 [-0.36 , 1.08]
Park 2015	49	23	8	48	19	8	10.3%	0.04 [-0.94 , 1.02]
Picelli 2015	207.3	69.9	20	197.2	53.7	10	13.6%	0.15 [-0.61 , 0.91]
Yi 2016	2	1.1	20	2.3	1.2	10	13.5%	-0.26 [-1.02 , 0.50]
Subtotal (95% CI)			**107**			**97**	**100.0%**	**0.28 [-0.12 , 0.69]**
Heterogeneity: Tau² = 0.16; Chi² = 13.58, df = 7 (P = 0.06); I² = 48%								
Test for overall effect: Z = 1.36 (P = 0.17)								
1.5.2 Change scores								
Danzl 2012	0.2	100	4	0.0001	10	4	15.8%	0.00 [-1.38 , 1.39]
Fusco 2014	0.17	0.19	6	0.08	0.16	5	20.7%	0.46 [-0.75 , 1.68]
Seo 2017	2.36	3.07	11	1.73	1.27	10	41.0%	0.25 [-0.61 , 1.11]
Tahtis 2012	4.64	5.07	7	0.01	1.87	7	22.6%	1.13 [-0.02 , 2.29]
Subtotal (95% CI)			**28**			**26**	**100.0%**	**0.46 [-0.09 , 1.01]**
Heterogeneity: Tau² = 0.00; Chi² = 1.94, df = 3 (P = 0.58); I² = 0%								
Test for overall effect: Z = 1.62 (P = 0.10)								
Test for subgroup differences: Chi² = 0.25, df = 1 (P = 0.62), I² = 0%								



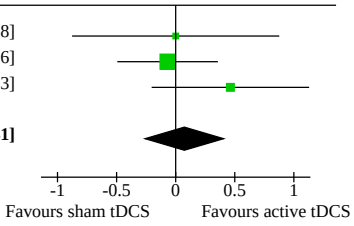
Analysis 1.6. Comparison 1: tDCS versus any type of placebo or passive control intervention, Outcome 6: Secondary outcome measure: muscle strength at the end of the intervention period

Study or Subgroup	Active tDCS Mean	SD	Total	Sham tDCS Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
1.6.1 Absolute values								
Andrade 2017	7.7	5.8	40	5.3	4.8	20	13.2%	0.43 [-0.11 , 0.97]
Bolognini 2011	2.8	1.7	7	3	2.6	7	3.5%	-0.09 [-1.13 , 0.96]
Di Lazzaro 2014a	0.37	0.36	7	0.34	0.32	7	3.5%	0.08 [-0.97 , 1.13]
Di Lazzaro 2014b	0.38	0.28	10	0.32	0.1	10	5.0%	0.27 [-0.61 , 1.15]
Fusco 2013a	18.8	9.6	5	17.5	3	4	2.2%	0.15 [-1.16 , 1.47]
Hesse 2011	12.8	11.4	63	12.8	12.1	32	21.4%	0.00 [-0.43 , 0.43]
Khedr 2013	3.3	1.5	28	2.4	1.1	13	8.5%	0.64 [-0.04 , 1.31]
Koo 2018	17	9	12	13	11	12	5.9%	0.38 [-0.42 , 1.19]
Lee 2014	3	2.3	39	2.8	2.1	20	13.3%	0.09 [-0.45 , 0.63]
Picelli 2015	69.6	10.1	20	60.7	12	10	6.2%	0.81 [0.02 , 1.60]
Rocha 2016	17.8	7.7	14	17.8	11.5	7	4.7%	0.00 [-0.91 , 0.91]
Salazar 2019	8.9	5.3	15	10.8	4.5	15	7.4%	-0.38 [-1.10 , 0.35]
Viana 2014	14	9	10	13.8	6.3	10	5.0%	0.02 [-0.85 , 0.90]
Subtotal (95% CI)			**270**			**167**	**100.0%**	**0.19 [-0.01 , 0.38]**
Heterogeneity: Tau² = 0.00; Chi² = 8.90, df = 12 (P = 0.71); I² = 0%								
Test for overall effect: Z = 1.85 (P = 0.06)								
1.6.2 Change values								
Fusco 2014	-1.4	1.9	5	1	2	6	15.1%	-1.12 [-2.44 , 0.20]
Geroin 2011	27	2.4	10	17.8	9.7	20	21.6%	1.10 [0.29 , 1.92]
Mazzoleni 2019	15.6	9.7	20	14.11	10.66	19	24.3%	0.14 [-0.49 , 0.77]
Mortensen 2016	13	17	8	2.7	13.8	7	18.4%	0.62 [-0.43 , 1.67]
Seo 2017	1.9	1.3	11	3.6	3	10	20.6%	-0.72 [-1.61 , 0.17]
Subtotal (95% CI)			**54**			**62**	**100.0%**	**0.07 [-0.66 , 0.80]**
Heterogeneity: Tau² = 0.47; Chi² = 13.24, df = 4 (P = 0.01); I² = 70%								
Test for overall effect: Z = 0.19 (P = 0.85)								
Test for subgroup differences: Chi² = 0.09, df = 1 (P = 0.77), I² = 0%								



Analysis 1.7. Comparison 1: tDCS versus any type of placebo or passive control intervention, Outcome 7: Secondary outcome measure: muscle strength at the end of follow-up

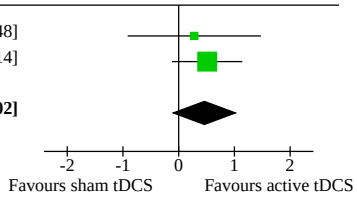
Study or Subgroup	Active tDCS Mean	SD	Total	Sham tDCS Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
Di Lazzaro 2014b	0.67	0.4	10	0.67	0.41	10	14.3%	0.00 [-0.88 , 0.88]
Hesse 2011	12.6	12.4	63	13.5	14.3	32	60.8%	-0.07 [-0.49 , 0.36]
Khedr 2013	4.4	1.9	28	3.6	1.1	13	24.8%	0.46 [-0.20 , 1.13]
Total (95% CI)			**101**			**55**	**100.0%**	**0.07 [-0.26 , 0.41]**
Heterogeneity: Tau² = 0.00; Chi² = 1.77, df = 2 (P = 0.41); I² = 0%								
Test for overall effect: Z = 0.43 (P = 0.66)								
Test for subgroup differences: Not applicable								



Analysis 1.8. Comparison 1: tDCS versus any type of placebo or passive control intervention, Outcome 8: Secondary outcome measure: cognitive abilities at the end of the intervention period

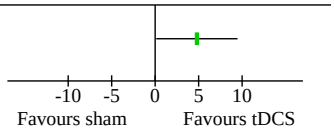
Study or Subgroup	Active tDCS Mean	SD	Total	Sham tDCS Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
Park 2013	1.4	0.4	6	1.3	0.2	5	21.7%	0.28 [-0.92 , 1.48]
Yun 2015	23.5	3.1	30	21.7	4.1	15	78.3%	0.51 [-0.12 , 1.14]
Total (95% CI)			**36**			**20**	**100.0%**	**0.46 [-0.10 , 1.02]**

Heterogeneity: Tau² = 0.00; Chi² = 0.11, df = 1 (P = 0.74); I² = 0%
Test for overall effect: Z = 1.62 (P = 0.10)
Test for subgroup differences: Not applicable



Analysis 1.9. Comparison 1: tDCS versus any type of placebo or passive control intervention, Outcome 9: Secondary outcome measure: hemispatial neglect at the end of intervention period

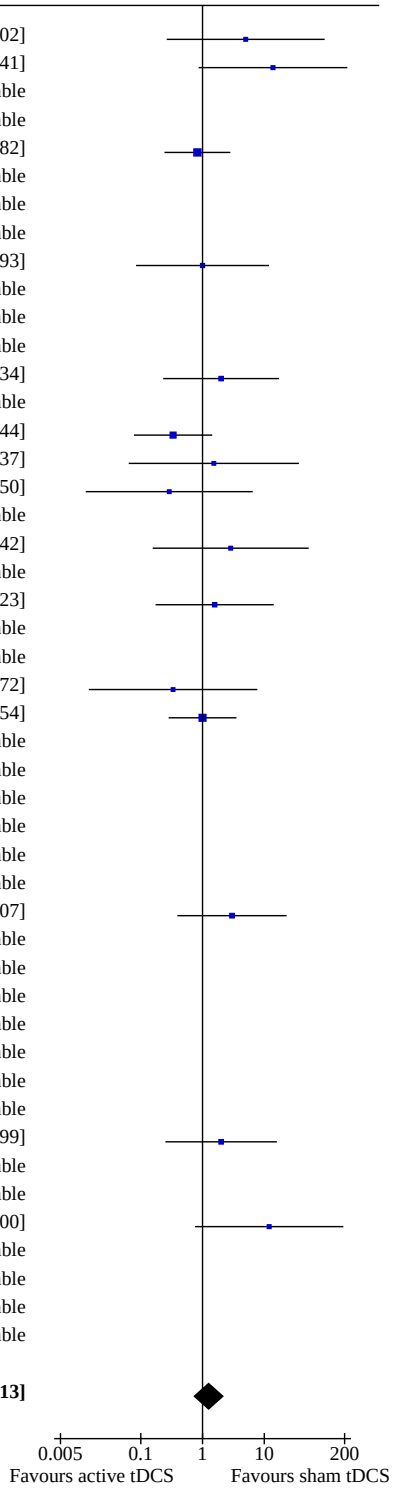
Study or Subgroup	Active tDCS Mean	SD	Total	Sham tDCS Mean	SD	Total	Mean Difference IV, Random, 95% CI
Yi 2016	13.3	8.1	20	8.5	4.9	10	4.80 [0.13 , 9.47]



Analysis 1.10. Comparison 1: tDCS versus any type of placebo or passive control intervention, Outcome 10: Secondary outcome measure: dropouts, adverse events and deaths during the intervention period

Study or Subgroup	Active tDCS Events	Active tDCS Total	Sham tDCS Events	Sham tDCS Total	Weight	Risk Ratio M-H, Random, 95% CI
Allman 2016	2	13	0	13	3.2%	5.00 [0.26 , 95.02]
Andrade 2017	13	40	0	20	3.6%	13.83 [0.86 , 221.41]
Ang 2012	0	10	0	9		Not estimable
Boggio 2007a	0	3	0	3		Not estimable
Bolognini 2011	3	10	4	11	18.2%	0.82 [0.24 , 2.82]
Cha 2014	0	10	0	10		Not estimable
Chang 2015	0	12	0	12		Not estimable
Cunningham 2015	0	6	0	6		Not estimable
Danzl 2012	1	5	1	5	4.5%	1.00 [0.08 , 11.93]
Di Lazzaro 2014a	0	7	0	7		Not estimable
Di Lazzaro 2014b	0	10	0	10		Not estimable
Fusco 2013a	0	5	0	4		Not estimable
Fusco 2014	2	7	1	7	6.0%	2.00 [0.23 , 17.34]
Geroin 2011	0	10	0	10		Not estimable
Hamoudi 2018	2	18	6	18	12.9%	0.33 [0.08 , 1.44]
Hesse 2011	1	64	0	32	2.8%	1.52 [0.06 , 36.37]
Ilić 2016	0	14	1	12	2.9%	0.29 [0.01 , 6.50]
Khedr 2013	0	27	0	13		Not estimable
Kim 2010	2	13	0	7	3.3%	2.86 [0.16 , 52.42]
Koo 2018	0	12	0	12		Not estimable
Lee 2014	3	42	1	22	5.7%	1.57 [0.17 , 14.23]
Lindenberg 2010	0	10	0	10		Not estimable
Manji 2018	0	15	0	15		Not estimable
Mazzoleni 2019	0	20	1	20	2.8%	0.33 [0.01 , 7.72]
Mortensen 2016	3	8	3	8	17.2%	1.00 [0.28 , 3.54]
Nair 2011	0	7	0	7		Not estimable
Nicolo 2017	0	24	0	13		Not estimable
Park 2013	0	6	0	5		Not estimable
Park 2015	0	8	0	8		Not estimable
Picelli 2015	0	20	0	10		Not estimable
Qu 2009	0	25	0	25		Not estimable
Rabadi 2017	3	8	1	8	6.7%	3.00 [0.39 , 23.07]
Rocha 2016	0	14	0	7		Not estimable
Rossi 2013	0	25	0	25		Not estimable
Saeys 2015	0	31	0	31		Not estimable
Salazar 2019	0	15	0	15		Not estimable
Sattler 2015	0	10	0	10		Not estimable
Seo 2017	0	11	0	10		Not estimable
Shaheiwola 2018	0	15	0	15		Not estimable
Sik 2015	4	24	1	12	6.4%	2.00 [0.25 , 15.99]
Straudi 2016	0	12	0	11		Not estimable
Tahtis 2012	0	7	0	7		Not estimable
Tedesco Triccas 2015b	6	12	0	11	3.6%	12.00 [0.75 , 191.00]
Utarapichat 2018	0	10	0	10		Not estimable
Viana 2014	0	10	0	10		Not estimable
Wang 2014	0	6	0	3		Not estimable
Wu 2013a	0	45	0	45		Not estimable
Total (95% CI)		**736**		**594**	**100.0%**	**1.25 [0.74 , 2.13]**
Total events:	45		20			

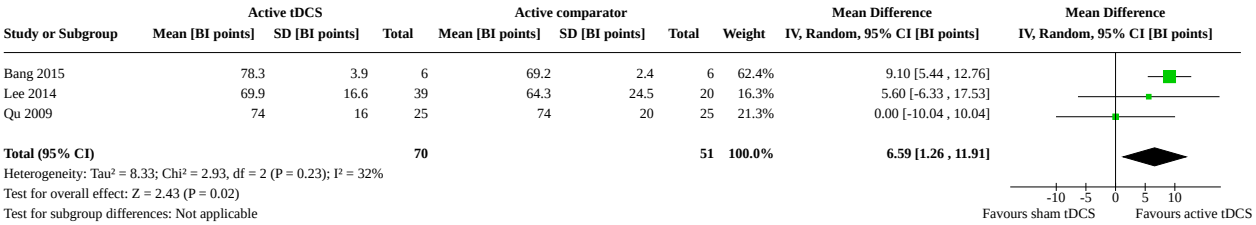
Heterogeneity: Tau² = 0.01; Chi² = 14.11, df = 14 (P = 0.44); I² = 1%
Test for overall effect: Z = 0.83 (P = 0.40)
Test for subgroup differences: Not applicable



Comparison 2. tDCS versus any type of active control intervention

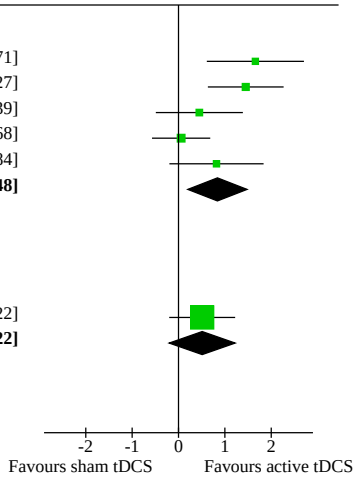
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
2.1 Primary outcome measure: ADL at the end of the intervention period, absolute values	3	121	Mean Difference (IV, Random, 95% CI)	6.59 [1.26, 11.91]
2.2 Secondary outcome measure: upper extremity function at the end of the intervention period	6		Std. Mean Difference (IV, Random, 95% CI)	Subtotals only
2.2.1 Absolute values	5	124	Std. Mean Difference (IV, Random, 95% CI)	0.84 [0.20, 1.48]
2.2.2 Change scores	1	32	Std. Mean Difference (IV, Random, 95% CI)	0.51 [-0.20, 1.22]
2.3 Secondary outcome measure: upper extremity function to the end of follow-up	1	32	Mean Difference (IV, Random, 95% CI)	10.00 [-0.07, 20.07]
2.4 Secondary outcome measure: lower extremity function at the end of the intervention period	3	66	Std. Mean Difference (IV, Random, 95% CI)	0.23 [-0.66, 1.13]
2.5 Secondary outcome measure: muscle strength at the end of the intervention period	2	57	Std. Mean Difference (IV, Random, 95% CI)	0.08 [-0.44, 0.60]
2.6 Secondary outcome measure: spatial neglect at the end of the intervention period	1		Mean Difference (IV, Random, 95% CI)	Totals not selected
2.7 Secondary outcome measure: dropouts, adverse events and deaths during the intervention period	7	209	Risk Ratio (M-H, Random, 95% CI)	1.76 [0.43, 7.17]

Analysis 2.1. Comparison 2: tDCS versus any type of active control intervention, Outcome 1: Primary outcome measure: ADL at the end of the intervention period, absolute values



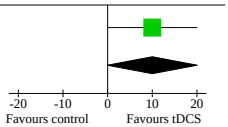
Analysis 2.2. Comparison 2: tDCS versus any type of active control intervention, Outcome 2: Secondary outcome measure: upper extremity function at the end of the intervention period

Study or Subgroup	Active tDCS Mean	SD	Total	Active comparator Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
2.2.1 Absolute values								
Cha 2014	48.7	12.5	10	29.7	9.2	10	17.3%	1.66 [0.61 , 2.71]
Cho 2017	42	10	15	23	15	15	21.2%	1.45 [0.63 , 2.27]
Hathaiareerug 2019	40.4	16.7	9	33.4	12.7	9	19.1%	0.45 [-0.49 , 1.39]
Lee 2014	42.9	23.6	19	41.6	21.3	20	24.7%	0.06 [-0.57 , 0.68]
Wong 2015	50.3	9.8	10	41.3	11.3	7	17.8%	0.82 [-0.20 , 1.84]
Subtotal (95% CI)			**63**			**61**	**100.0%**	**0.84 [0.20 , 1.48]**
Heterogeneity: Tau² = 0.33; Chi² = 10.79, df = 4 (P = 0.03); I² = 63%								
Test for overall effect: Z = 2.58 (P = 0.01)								
2.2.2 Change scores								
Hamoudi 2018	7.5	14.8	18	0.5	11.2	14	100.0%	0.51 [-0.20 , 1.22]
Subtotal (95% CI)			**18**			**14**	**100.0%**	**0.51 [-0.20 , 1.22]**
Heterogeneity: Not applicable								
Test for overall effect: Z = 1.41 (P = 0.16)								
Test for subgroup differences: Chi² = 0.45, df = 1 (P = 0.50), I² = 0%								



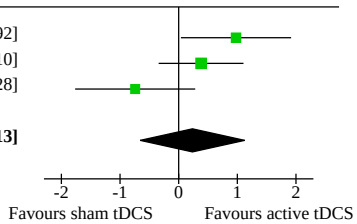
Analysis 2.3. Comparison 2: tDCS versus any type of active control intervention, Outcome 3: Secondary outcome measure: upper extremity function to the end of follow-up

Study or Subgroup	Active tDCS Mean [%JTTchange]	SD [%JTTchange]	Total	Active comparator Mean [%JTTchange]	SD [%JTTchange]	Total	Weight	Mean Difference IV, Random, 95% CI [%JTTchange]
Hamoudi 2018	17.5	10.6	18	7.5	16.8	14	100.0%	10.00 [-0.07 , 20.07]
Total (95% CI)			**18**			**14**	**100.0%**	**10.00 [-0.07 , 20.07]**
Heterogeneity: Not applicable								
Test for overall effect: Z = 1.95 (P = 0.05)								
Test for subgroup differences: Not applicable								



Analysis 2.4. Comparison 2: tDCS versus any type of active control intervention, Outcome 4: Secondary outcome measure: lower extremity function at the end of the intervention period

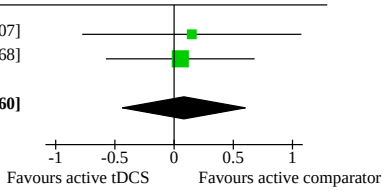
Study or Subgroup	Active tDCS Mean	SD	Total	Active comparator Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
Cha 2014	27.8	3.6	10	22.5	6.4	10	32.2%	0.98 [0.04 , 1.92]
Cho 2017	24	6	15	21	9	15	37.7%	0.38 [-0.34 , 1.10]
Park 2015	0.5	0.2	8	0.7	0.3	8	30.2%	-0.74 [-1.77 , 0.28]
Total (95% CI)			**33**			**33**	**100.0%**	**0.23 [-0.66 , 1.13]**
Heterogeneity: Tau² = 0.41; Chi² = 6.02, df = 2 (P = 0.05); I² = 67%								
Test for overall effect: Z = 0.52 (P = 0.61)								
Test for subgroup differences: Not applicable								



Analysis 2.5. Comparison 2: tDCS versus any type of active control intervention, Outcome 5: Secondary outcome measure: muscle strength at the end of the intervention period

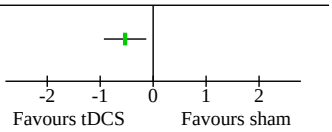
Study or Subgroup	Active tDCS Mean	SD	Total	Active comparator Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
Hathaiareerug 2019	9.1	11.8	9	7.5	8.3	9	31.5%	0.15 [-0.78 , 1.07]
Lee 2014	2.9	1.6	19	2.8	2.1	20	68.5%	0.05 [-0.58 , 0.68]
Total (95% CI)			**28**			**29**	**100.0%**	**0.08 [-0.44 , 0.60]**

Heterogeneity: Tau² = 0.00; Chi² = 0.03, df = 1 (P = 0.86); I² = 0%
Test for overall effect: Z = 0.31 (P = 0.75)
Test for subgroup differences: Not applicable



Analysis 2.6. Comparison 2: tDCS versus any type of active control intervention, Outcome 6: Secondary outcome measure: spatial neglect at the end of the intervention period

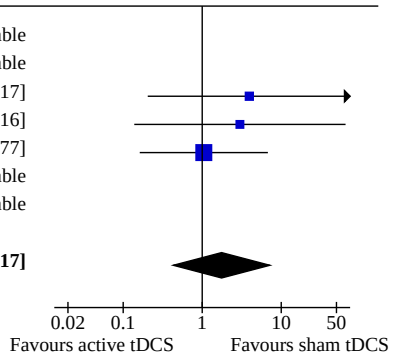
Study or Subgroup	Active tDCS Mean	SD	Total	Active comparator Mean	SD	Total	Mean Difference IV, Random, 95% CI
Bang 2015	5.37	0.4	6	5.9	0.3	6	-0.53 [-0.93 , -0.13]



Analysis 2.7. Comparison 2: tDCS versus any type of active control intervention, Outcome 7: Secondary outcome measure: dropouts, adverse events and deaths during the intervention period

Study or Subgroup	Active tDCS Events	Total	Active comparator Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Cha 2014	0	10	0	10		Not estimable
Cho 2017	0	15	0	15		Not estimable
Hamoudi 2018	2	18	0	14	22.5%	3.95 [0.20 , 76.17]
Hathaiareerug 2019	1	9	0	9	20.8%	3.00 [0.14 , 65.16]
Lee 2014	2	21	2	22	56.6%	1.05 [0.16 , 6.77]
Park 2015	0	8	0	8		Not estimable
Qu 2009	0	25	0	25		Not estimable
Total (95% CI)		**106**		**103**	**100.0%**	**1.76 [0.43 , 7.17]**
Total events:	5		2			

Heterogeneity: Tau² = 0.00; Chi² = 0.71, df = 2 (P = 0.70); I² = 0%
Test for overall effect: Z = 0.79 (P = 0.43)
Test for subgroup differences: Not applicable



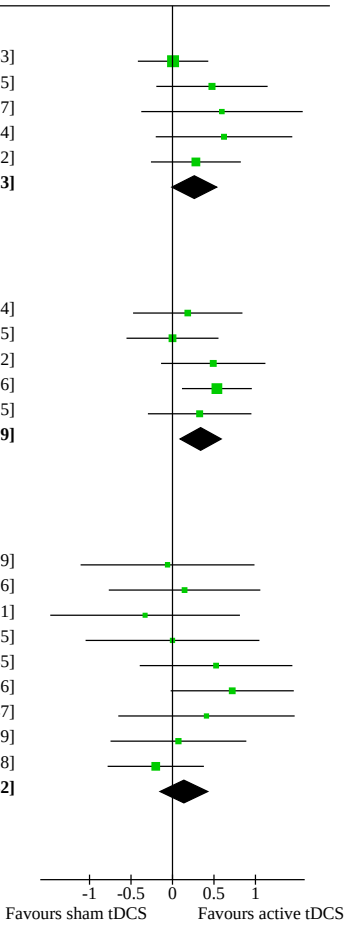
Comparison 3. Subgroup analyses for primary outcome measure: ADL at the end of the intervention period

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
3.1 Planned analysis: duration of illness - acute/subacute phase versus postacute phase for ADL at the end of the intervention period	19		Std. Mean Difference (IV, Random, 95% CI)	Subtotals only

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
3.1.1 Acute/subacute phase (the first week after stroke and the second to the fourth week after stroke	5	237	Std. Mean Difference (IV, Random, 95% CI)	0.26 [-0.01, 0.53]
3.1.2 Postacute phase (from the first to the sixth month after stroke)	5	271	Std. Mean Difference (IV, Random, 95% CI)	0.34 [0.09, 0.59]
3.1.3 Chronic phase (from the sixth month after stroke)	9	198	Std. Mean Difference (IV, Random, 95% CI)	0.14 [-0.15, 0.42]
3.2 Planned analysis: effects of type of stimulation (A-tDCS/C-tDCS/dual-tDCS) and location of stimulation (lesioned/non-lesioned hemisphere) on ADL at the end of the intervention period (study groups collapsed)	18		Std. Mean Difference (IV, Random, 95% CI)	Subtotals only
3.2.1 A-tDCS over the lesioned hemisphere	12	300	Std. Mean Difference (IV, Random, 95% CI)	0.08 [-0.15, 0.31]
3.2.2 C-tDCS over the lesioned hemisphere	10	388	Std. Mean Difference (IV, Random, 95% CI)	0.30 [0.09, 0.50]
3.2.3 Dual-tDCS (A-tDCS over the lesioned and C-tDCS over the non-lesioned hemisphere)	3	46	Std. Mean Difference (IV, Random, 95% CI)	0.33 [-0.25, 0.92]
3.3 Planned analysis: type of control intervention (sham tDCS, conventional therapy or nothing)	21		Std. Mean Difference (IV, Random, 95% CI)	Subtotals only
3.3.1 Sham tDCS	19	686	Std. Mean Difference (IV, Random, 95% CI)	0.28 [0.13, 0.44]
3.3.2 Active control intervention	3	121	Std. Mean Difference (IV, Random, 95% CI)	0.57 [-0.31, 1.45]

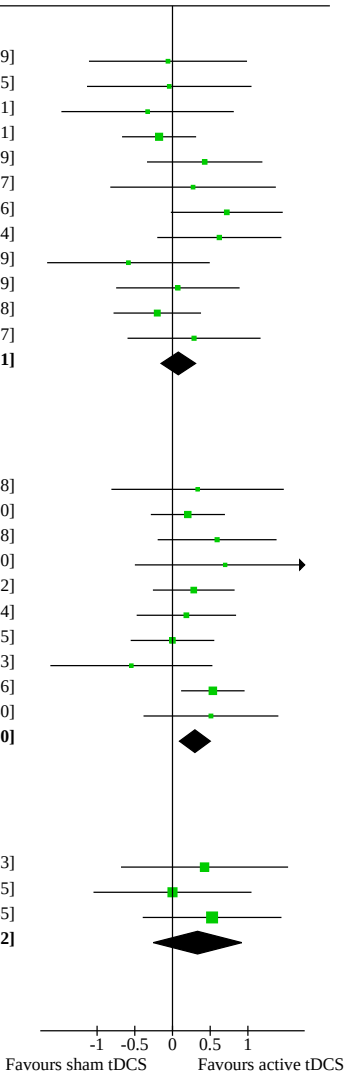
Analysis 3.1. Comparison 3: Subgroup analyses for primary outcome measure: ADL at the end of the intervention period, Outcome 1: Planned analysis: duration of illness - acute/ subacute phase versus postacute phase for ADL at the end of the intervention period

Study or Subgroup	Active tDCS Mean	SD	Total	Sham tDCS Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
3.1.1 Acute/subacute phase (the first week after stroke and the second to the fourth week after stroke								
Hesse 2011	56.4	13.45	64	56.3	15.5	32	40.5%	0.01 [-0.42 , 0.43]
Khedr 2013	52	24.5	27	41	18	13	16.2%	0.48 [-0.19 , 1.15]
Kim 2010	86	14.4	11	71	34.4	7	7.7%	0.60 [-0.38 , 1.57]
Koo 2018	65.3	13	12	55.2	18	12	10.8%	0.62 [-0.20 , 1.44]
Lee 2014	69.9	16.6	39	64.3	24.5	20	24.8%	0.28 [-0.26 , 0.82]
Subtotal (95% CI)			**153**			**84**	**100.0%**	**0.26 [-0.01 , 0.53]**
Heterogeneity: Tau² = 0.00; Chi² = 2.97, df = 4 (P = 0.56); I² = 0%								
Test for overall effect: Z = 1.91 (P = 0.06)								
3.1.2 Postacute phase (from the first to the sixth month after stroke)								
Nicolo 2017	0.3	0.5	28	0.2	0.6	13	14.1%	0.18 [-0.48 , 0.84]
Qu 2009	74	16	25	74	20	25	20.0%	0.00 [-0.55 , 0.55]
Qu 2017	61	10	30	56	10	15	15.5%	0.49 [-0.14 , 1.12]
Wu 2013a	76.2	19.6	45	65.4	20.4	45	34.6%	0.54 [0.11 , 0.96]
Yun 2015	71.8	21.7	30	64.4	23.2	15	15.8%	0.33 [-0.30 , 0.95]
Subtotal (95% CI)			**158**			**113**	**100.0%**	**0.34 [0.09 , 0.59]**
Heterogeneity: Tau² = 0.00; Chi² = 2.71, df = 4 (P = 0.61); I² = 0%								
Test for overall effect: Z = 2.68 (P = 0.007)								
3.1.3 Chronic phase (from the sixth month after stroke)								
Bolognini 2011	2.3	3.6	7	2.5	2.6	7	7.5%	-0.06 [-1.11 , 0.99]
Chelette 2014	65.1	25.5	20	61.5	16.9	6	9.9%	0.15 [-0.77 , 1.06]
Cunningham 2015	2	1.3	6	2.4	0.9	6	6.3%	-0.33 [-1.47 , 0.81]
Di Lazzaro 2014a	-3	1	7	-3	1.3	7	7.5%	0.00 [-1.05 , 1.05]
Di Lazzaro 2014b	-2.4	1.17	10	-3.1	1.38	9	9.7%	0.53 [-0.39 , 1.45]
Kim 2016	79.6	11.3	15	68.3	18.4	15	15.0%	0.72 [-0.02 , 1.46]
Rocha 2016	3.25	0.8	7	2.9	0.8	7	7.3%	0.41 [-0.65 , 1.47]
Straudi 2016	1	1.3	12	0.9	1.4	11	12.3%	0.07 [-0.75 , 0.89]
Tedesco Triccas 2015b	1.2	2.1	22	1.6	1.8	24	24.5%	-0.20 [-0.78 , 0.38]
Subtotal (95% CI)			**106**			**92**	**100.0%**	**0.14 [-0.15 , 0.42]**
Heterogeneity: Tau² = 0.00; Chi² = 5.49, df = 8 (P = 0.70); I² = 0%								
Test for overall effect: Z = 0.94 (P = 0.35)								
Test for subgroup differences: Chi² = 1.09, df = 2 (P = 0.58), I² = 0%								



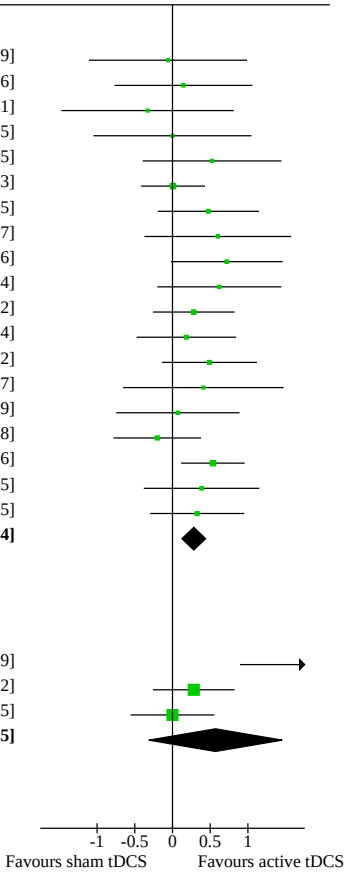
Analysis 3.2. Comparison 3: Subgroup analyses for primary outcome measure: ADL at the end of the intervention period, Outcome 2: Planned analysis: effects of type of stimulation (A-tDCS/C-tDCS/dual-tDCS) and location of stimulation (lesioned/non-lesioned hemisphere) on ADL at the end of the intervention period (study groups collapsed)

Study or Subgroup	Active tDCS Mean	SD	Total	Sham tDCS Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
3.2.1 A-tDCS over the lesioned hemisphere								
Bolognini 2011	2.3	3.6	7	2.5	2.6	7	4.8%	-0.06 [-1.11 , 0.99]
Chelette 2014	60.8	13.6	7	61.5	16.9	6	4.4%	-0.04 [-1.13 , 1.05]
Cunningham 2015	2	1.3	6	2.4	0.9	6	4.0%	-0.33 [-1.47 , 0.81]
Hesse 2011	53.6	14.5	32	56.3	15.5	32	21.7%	-0.18 [-0.67 , 0.31]
Khedr 2013	52	30	14	41	18	13	8.9%	0.43 [-0.34 , 1.19]
Kim 2010	79	14.7	6	71	34.4	7	4.3%	0.27 [-0.82 , 1.37]
Kim 2016	79.6	11.3	15	68.3	18.4	15	9.5%	0.72 [-0.02 , 1.46]
Koo 2018	65.3	13	12	55.2	18	12	7.7%	0.62 [-0.20 , 1.44]
Rocha 2016	2.3	1.1	7	2.9	0.8	7	4.5%	-0.58 [-1.66 , 0.49]
Straudi 2016	1	1.3	12	0.9	1.4	11	7.8%	0.07 [-0.75 , 0.89]
Tedesco Triccas 2015b	1.2	2.1	22	1.6	1.8	24	15.6%	-0.20 [-0.78 , 0.38]
Yi 2016	42.1	21.3	10	36.8	13.3	10	6.7%	0.29 [-0.60 , 1.17]
Subtotal (95% CI)			**150**			**150**	**100.0%**	**0.08 [-0.15 , 0.31]**
Heterogeneity: Tau² = 0.00; Chi² = 9.67, df = 11 (P = 0.56); I² = 0%								
Test for overall effect: Z = 0.66 (P = 0.51)								
3.2.2 C-tDCS over the lesioned hemisphere								
Chelette 2014	67	13.4	6	61.5	16.9	6	3.2%	0.33 [-0.81 , 1.48]
Hesse 2011	59.2	12.4	32	56.3	15.5	32	17.3%	0.20 [-0.29 , 0.70]
Khedr 2013	52	18	13	41	18	13	6.7%	0.59 [-0.20 , 1.38]
Kim 2010	92	12.3	5	71	34.4	7	2.9%	0.70 [-0.50 , 1.90]
Lee 2014	69.9	16.6	39	64.3	24.5	20	14.2%	0.28 [-0.26 , 0.82]
Nicolo 2017	0.3	0.5	28	0.2	0.6	13	9.6%	0.18 [-0.48 , 0.84]
Qu 2009	74	16	25	74	20	25	13.6%	0.00 [-0.55 , 0.55]
Rocha 2016	2.2	1.5	7	2.9	0.8	7	3.6%	-0.55 [-1.62 , 0.53]
Wu 2013a	76.2	19.6	45	65.4	20.4	45	23.6%	0.54 [0.11 , 0.96]
Yi 2016	46	20.5	10	36.8	13.3	10	5.2%	0.51 [-0.38 , 1.40]
Subtotal (95% CI)			**210**			**178**	**100.0%**	**0.30 [0.09 , 0.50]**
Heterogeneity: Tau² = 0.00; Chi² = 6.14, df = 9 (P = 0.73); I² = 0%								
Test for overall effect: Z = 2.85 (P = 0.004)								
3.2.3 Dual-tDCS (A-tDCS over the lesioned and C-tDCS over the non-lesioned hemisphere)								
Chelette 2014	67.8	10.5	7	61.5	16.9	6	28.0%	0.43 [-0.68 , 1.53]
Di Lazzaro 2014a	-3	1	7	-3	1.3	7	31.3%	0.00 [-1.05 , 1.05]
Di Lazzaro 2014b	-2.4	1.17	10	-3.1	1.38	9	40.6%	0.53 [-0.39 , 1.45]
Subtotal (95% CI)			**24**			**22**	**100.0%**	**0.33 [-0.25 , 0.92]**
Heterogeneity: Tau² = 0.00; Chi² = 0.58, df = 2 (P = 0.75); I² = 0%								
Test for overall effect: Z = 1.11 (P = 0.27)								
Test for subgroup differences: Chi² = 2.16, df = 2 (P = 0.34), I² = 7.4%								



Analysis 3.3. Comparison 3: Subgroup analyses for primary outcome measure: ADL at the end of the intervention period, Outcome 3: Planned analysis: type of control intervention (sham tDCS, conventional therapy or nothing)

Study or Subgroup	Active tDCS Mean	SD	Total	Sham tDCS Mean	SD	Total	Weight	Std. Mean Difference IV, Random, 95% CI
3.3.1 Sham tDCS								
Bolognini 2011	2.3	3.6	7	2.5	2.6	7	2.2%	-0.06 [-1.11 , 0.99]
Chelette 2014	65.1	25.5	20	61.5	16.9	6	3.0%	0.15 [-0.77 , 1.06]
Cunningham 2015	2	1.3	6	2.4	0.9	6	1.9%	-0.33 [-1.47 , 0.81]
Di Lazzaro 2014a	-3	1	7	-3	1.3	7	2.2%	0.00 [-1.05 , 1.05]
Di Lazzaro 2014b	-2.4	1.17	10	-3.1	1.38	9	2.9%	0.53 [-0.39 , 1.45]
Hesse 2011	56.4	13.5	64	56.3	15.5	32	13.7%	0.01 [-0.42 , 0.43]
Khedr 2013	52	24.5	27	41	18	13	5.5%	0.48 [-0.19 , 1.15]
Kim 2010	86.1	14.4	11	71	34.4	7	2.6%	0.60 [-0.37 , 1.57]
Kim 2016	79.6	11.3	15	68.3	18.4	15	4.5%	0.72 [-0.02 , 1.46]
Koo 2018	65.3	13	12	55.2	18	12	3.6%	0.62 [-0.20 , 1.44]
Lee 2014	69.9	16.6	39	64.3	24.5	20	8.4%	0.28 [-0.26 , 0.82]
Nicolo 2017	0.3	0.5	28	0.2	0.6	13	5.7%	0.18 [-0.48 , 0.84]
Qu 2017	61	10	30	56	10	15	6.2%	0.49 [-0.14 , 1.12]
Rocha 2016	3.25	0.8	7	2.9	0.8	7	2.2%	0.41 [-0.65 , 1.47]
Straudi 2016	1	1.3	12	0.9	1.4	11	3.7%	0.07 [-0.75 , 0.89]
Tedesco Triccas 2015b	1.2	2.1	22	1.6	1.8	24	7.3%	-0.20 [-0.78 , 0.38]
Wu 2013a	76.2	19.6	45	65.4	20.4	45	13.9%	0.54 [0.11 , 0.96]
Yi 2016	44.1	20.4	20	36.8	13.3	10	4.2%	0.39 [-0.38 , 1.15]
Yun 2015	71.8	21.7	30	64.4	23.2	15	6.3%	0.33 [-0.30 , 0.95]
Subtotal (95% CI)			**412**			**274**	**100.0%**	**0.28 [0.13 , 0.44]**
Heterogeneity: Tau² = 0.00; Chi² = 11.45, df = 18 (P = 0.87); I² = 0%								
Test for overall effect: Z = 3.53 (P = 0.0004)								
3.3.2 Active control intervention								
Bang 2015	78.3	3.9	6	69.2	2.4	6	17.5%	2.59 [0.90 , 4.29]
Lee 2014	69.9	16.6	39	64.3	24.5	20	41.4%	0.28 [-0.26 , 0.82]
Qu 2009	74	16	25	74	20	25	41.1%	0.00 [-0.55 , 0.55]
Subtotal (95% CI)			**70**			**51**	**100.0%**	**0.57 [-0.31 , 1.45]**
Heterogeneity: Tau² = 0.42; Chi² = 8.11, df = 2 (P = 0.02); I² = 75%								
Test for overall effect: Z = 1.26 (P = 0.21)								
Test for subgroup differences: Chi² = 0.39, df = 1 (P = 0.53), I² = 0%								



ADDITIONAL TABLES

Table 1. Sensitivity analyses for comparison 1.1: primary outcome of ADL performance at the end of the intervention period

Sensitivity analysis	Studies included in analysis	Effect estimate
All studies with proper allocation concealment presenting absolute values	Hesse 2011; Khedr 2013; Kim 2010; Rocha 2016; Tedesco Triccas 2015b; Wu 2013a	(SMD 0.25, 95% CI -0.03 to 0.53; participants = 304; studies = 6; I^2 = 22%; inverse variance method with random-effects model)
All studies with proper allocation concealment presenting change scores	Andrade 2017; Rabadi 2017	(SMD 0.31, 95% CI -0.49 to 1.11; participants = 76; studies = 2; I^2 = 53%; inverse variance method with random-effects model)
All studies with proper blinding of outcome assessor for primary outcome absolute values	Allman 2016; Andrade 2017; Ang 2012; Bang 2015; Boggio 2007a; Bolognini 2011; Cha 2014; Chang 2015; Chelette 2014; Cho 2017; Cunningham 2015; D'Agata 2016; Danzl 2012; Di Lazzaro 2014a; Di Lazzaro 2014b; Fusco 2013a; Fusco 2014; Geroin 2011; Hamoudi 2018; Hathaiareerug 2019; Hesse 2011; Ilić 2016; Khedr 2013; Kim 2010;	(SMD 0.23, 95% CI 0.05 to 0.41; participants = 536; studies = 15; I^2 = 0%; inverse variance method with random-effects model)

Table 1. Sensitivity analyses for comparison 1.1: primary outcome of ADL performance at the end of the intervention period *(Continued)*

	Koo 2018; Lee 2014; Lindenberg 2010; Manji 2018; Mazzoleni 2019; Mortensen 2016; Nair 2011; Nicolo 2017; Park 2013; Park 2015; Picelli 2015; Qu 2009; Rabadi 2017; Rocha 2016; Rossi 2013; Saeys 2015; Salazar 2019; Sattler 2015; Seo 2017; Shaheiwola 2018; Sik 2015; Straudi 2016; Tahtis 2012; Tedesco Triccas 2015b; Utarapichat 2018; Viana 2014; Wang 2014; Wong 2015; Wu 2013a	
All studies with proper blinding of outcome assessor for primary outcome change values	Danzl 2012; Fusco 2014	(SMD 0.77, 95% CI -0.21 to 1.75; participants = 19; studies = 2; I^2 = 0%; inverse variance method with random-effects model)
All studies with intention-to-treat analysis for primary outcome absolute values	Allman 2016; Andrade 2017; Ang 2012; Bang 2015; Boggio 2007a; Bolognini 2011; Cha 2014; Chang 2015; Chelette 2014; Cho 2017; Cunningham 2015; D'Agata 2016; Danzl 2012; Di Lazzaro 2014a; Di Lazzaro 2014b; Fusco 2013a; Fusco 2014; Geroin 2011; Hamoudi 2018; Hathaiareerug 2019; Hesse 2011; Ilić 2016; Khedr 2013; Koo 2018; Lindenberg 2010; Manji 2018; Mazzoleni 2019; Mortensen 2016; Nair 2011; Nicolo 2017; Park 2013; Park 2015; Picelli 2015; Qu 2009; Rabadi 2017; Rocha 2016; Rossi 2013; Saeys 2015; Salazar 2019; Sattler 2015; Seo 2017; Shaheiwola 2018; Sik 2015; Straudi 2016; Tahtis 2012; Utarapichat 2018; Viana 2014; Wang 2014; Wong 2015; Wu 2013a	(SMD 0.27, 95% CI 0.06 to 0.47; participants = 387; studies = 11; I^2 = 0%; inverse variance method with random-effects model)
All studies with intention-to-treat analysis for primary outcome change scores	Danzl 2012	(SMD 1.36, 95% CI -0.31 to 3.03; participants = 8; studies = 1; I^2 = 0%; inverse variance method with random-effects model)

CI: confidence interval
SMD: standardised mean difference

Table 2. Patient characteristics

Study ID	Experimental: age, mean (SD)	Control: age, mean (SD)	Experimental: time post stroke, mean (SD)	Control: time post stroke, mean (SD)	Experimental: sex, n (%)	Control: sex, n (%)	Experimental: lesioned hemisphere, n (%)	Control: lesioned hemisphere, n (%)	Experimental: severity, mean (SD)	Control: severity, mean (SD)	Experimental: lesion cause/location, n (%)	Control: lesion cause/location, n (%)	Handedness, n (%)
Allman 2016	60 (12) years	67 (10) years	51 (33) months	57 (40) months	3 (27) female	4 (31) female	3 (27) left	4 (31) left	UE-FM 39 (16)	UE-FM 36 (17)	2 (18) cortical	4 (31) cortical	Not stated
Andrade 2017	54 (4) years	55 (4) years	2 (2) months	2 (1) months	18 (45) female	8 (40) female	20 (50) left	10 (50) left	NIHSS 17 (1)	NIHSS17 (1)	15 (38) haemorrhagic, 17 (43) cortical	5 (25) haemorrhagic, 8 (40) cortical	Not stated
Ang 2012	52 (12) years	56 (10) years	3 (2) years	3 (1) years	4 (40) female	1 (11) female	5 (50) left	6 (67) left	UE-FM 35 (8)	UE-FM 33 (8)	6 (60) ischaemic; 1 (10) cortical, 9 (90) subcortical	7 (78) ischaemic; 9 (100) subcortical	Not stated
Au-Yeung 2014	63 (6) years		8 (3) years		0 female		5 (50) left		UE-FM 58 (8); MMSE 29 (2)		8 (80) ischaemic		10 (100) right-handed
Bang 2015	66 (4) years	66 (5) years	7 (2) weeks	7 (1) weeks	2 (50) female	2 (50) female	6 (100) right	6 (100) right	MBI 51 (5)	MBI 50 (6)	Not described		Not stated
Boggio 2007a	56 (11) years	75 (NA) years	33 (34) months	39 months	3 (100) male	1 (100) male	2 (67) left	1 (100) left	MRC 4.2 (0.53)	MRC 4.7 (NA)	3 (100) ischaemic and subcortical	1 (100) ischaemic and subcortical	12 (100) right-handed
Bolognini 2011	43 (13) years	51 (15) years	44 (31) months	26 (18) months	4 (57) female	5 (71) female	4 (57) left	4 (57) left	BI 18.13 (2.42)	BI 14.33 (5.46)	2 (29) haemorrhagic, 5 (71) ischaemic	7 (100) ischaemic	14 (100) right-handed
Cha 2014	60 (11) years	58 (10) years	14 (5) months	15 (4) months	Not stated	Not stated	4 (40) left	5 (50) left	Brunnstrom 5 (1)	Brunnstrom 5 (1)	Not stated	Not stated	Not stated
Chang 2015	60 (10) years	66 (11) years	16 (6) days	17 (5) days	9 (38) female		6 (50) left	5 (42) left	NIHSS 7 (4)	NIHSS 9 (5)	24 (100) ischaemic/11 (46) corona radiata, 7 (29) MCA, 4 (17) MCA border zone, 2 (8) internal capsule		Not stated

Table 2. Patient characteristics *(Continued)*

Chelette 2014	58(7) years	62 (5) years	5 (2) years	5 (1) years	9 (45) female	1 (17) female	14 (70) left	1 (17) left	SIS 62 (13)	SIS 57 (18)	16 (80) ischaemic/17 (81) cortical	6 (100) ischaemic/4 (67) cortical	16 (80) right-handed
Cho 2017	61 (9) years	58 (13) years	14 (6) days	14 (5) days	6 (40) female	7 (47) female	7 (47) left	7 (47) left	UE-FM 50 (19)	UE-FM 41 (13)	12 (75) ischaemic/5 (33) cortical	13 (87) ischaemic/4 (27) cortical	Not stated
Cunningham 2015	64 (8) years	59 (10) years	63 (81) months	37 (27) months	2 (33) female	2 (33) female	2 (33) left	4 (67) left	UE-FM 41 (14)	UE-FM 47 (11)	2 (33) haemorrhagic	2 (33) haemorrhagic	Not stated
D'Agata 2016	57 (12) years	65 (12) years	41 (39) months	37 (32) months	8 (33) female	3 (39) female	12 (50) left	6 (60) left	Not described clearly		17 (71) ischaemic/6 (25) cortical, 15 (62) subcortical, 3 (13) corticosubcortical	7 (70) ischaemic/1 (10) cortical, 8 (80) subcortical, 1 (10) corticosubcortical	Not stated
Danzl 2012	65 (15) years	71 (11) years	57 /55) months	39 (33) months	1 (25) female	3 (75) female	4 (100) left	4 (100) left			2 (50) ischaemic/not described	4 (100) ischaemic/not described	Not stated
Di Lazzaro 2014a	66 (16) years	71 (14) years	3 (1) days	3 (1) days	2 (29) female	3 (43) female	3 (43) left	3 (43) left	NIHSS 7 (5)	NIHSS 7 (4)	7 (100) ischaemic; 3 (43) subcortical; 4 (57) corticosubcortical	7 (100) ischaemic; 2 (29) subcortical, 5 (71) corticosubcortical	Not stated
Di Lazzaro 2014b	61 (16) years	69 (12) years	3 (2) days	3 (1) days	4 (40) female	6 (60) male	2 (20) left	6 (60) left	NIHSS 6 (3)	NIHSS 6 (2)	10 (100) ischaemic; 4 (40) subcortical, 6 (60) corticosubcortical	10 (100) ischaemic; 4 (40) subcortical, 6 (60) corticosubcortical	Not stated
Fregni 2005a	54 (17) years		27 (24) months		2 (33) female		3 (50) left		MRC 4.18 (0.37)		Cause not clearly stated by the authors		6 (100) right-handed
Fusco 2013a	44 (16) years	65 (22) years	31 (13) days	25 (5) days	3 (60) female	1 (25) female	3 (60) left	2 (50) left	Grasp force 17.83 (7.45) kg		5 (100) ischaemic	3 (75) ischaemic, 1 (25) haemorrhagic	9 (100) right-handed
Fusco 2014	56 (15) years	60 (12) years	19 (8) days		3 (60) female	3 (50) female	2 (40) left	2 (33) left	BI 33 (22)	BI 51 (34)	5 (100) ischaemic	6 (100) ischaemic	9 (73) right-handed

Table 2. Patient characteristics *(Continued)*

Geroin 2011	64 (7) years	63 (6) years	26 (6) months	27 (5) months	2 (20) female	4 (40) female	Not stated by the authors	Not stated by the authors	ESS 79.6 (4.1)	ESS 79.6 (2.7)	10 (100) ischaemic; 4 (40) cortical, 3 (30) corticosubcortical, 3 (30) subcortical	10 (100) ischaemic; 5 (50) cortical, 3 (30) corticosubcortical, 2 (20) subcortical	Not stated by the authors
Hamoudi 2018	62 (13) years	62 (13) years for sham tDCS and 65 (2) for passive control group	48 (80) months	44 (51) months for sham tDCS and 23 (4) months for passive control group	6 (33) female	3 (17) and 6 (43) female	9 (50) left	8 (44) and 7 (50) left	UE-FM 59 (4)	UE-FM 59 (4) and 59 (4)	18 (100) ischaemic/9 (50) subcortical	18 (100) ischaemic/9 (50) subcortical and 14 (100) ischaemic/7 (50) subcortical	EHI 78 in the Exp group, EHI 84 in the Sham group and EHI 90 in the Ctl group
Hathaiareerug 2019	56 (8) years	59 (10) years	6 (4) months	5 (3) months	1 (11) female	2 (22) female	4 (44) left	2 (22) left	UE-FM 38 (17)	UE-FM 32 (14)	6 (67) ischaemic/1 (11) cortical, 4 (44) subcortical, 4 (44) corticosubcortical	7 (77) ischaemic/1 (11) cortical, 3 (33) subcortical, 5 (55) corticosubcortical	89% right-handed
Hesse 2011	65 (10) years	66 (10) years	4 (2) weeks	4 (2) weeks	26 (41) female	11 (34) female	35 (55) left	16 (50) left	BI 34.15 (6.97); UE-FM 7.85 (3.58)	BI 35.0 (7.8); UE-FM 8.2 (4.4)	64 (100) ischaemic; 29 (45) TACI, 20 (31) PACI, 15 (23) LACI	32 (100) ischaemic; 13 (41) TACI, 13 (41) PACI, 6 (18) LACI	Not stated by the authors
Ilić 2016	58 (8) years	62 (4) years	41 (24) months	37 (21) months	10 (71) female	7 (58) female	13 (50) left		UE-FM 47 (8)	UE-FM 51 (6)	26 (100) ischaemic/26 (100) subcortical		24 (92) right-handed
Jo 2008a	48 (9) years		2 (1) months		3 (30) female		10 (100) right		Not reported		4 (40) ischaemic		Not stated by the authors

Table 2. Patient characteristics *(Continued)*

Kang 2008b	70 (3) years		544 (388) days		4 (40) female		7 (70) right		21 (1) MMSE		7 (70) ischaemic		Not stated by the authors
Khedr 2013	59 (9) years	57 (8) years	13 (5) days	13 (5) days	9 (33) female	5 (38) female	12 (44) left	6 (46) left	BI 32.76 (10.75)	BI 31.1 (12.6)	27 (100) ischaemic; 12 (44) cortical, 5 (19) corticosubcortical, 10 (37) subcortical	13 (100) ischaemic; 6 (42) cortical, 3 (23) corticosubcortical, 4 (31) subcortical	Not stated by the authors
Kim 2009	63 (13) years		6 (3) weeks		7 (70) female		8 (80) left		MRC between 3 and 5 for the all paretic finger flexors and extensors		8 (80) infarction, 2 (20) haemorrhage		Not stated by the authors
Kim 2010	54 (15) years	63 (9) years	27 (21) days	23 (8) days	2 (18) female	3 (43) female	7 (64) left	2 (29) left	BI 71.77 (23.86) UE-FM 34.7 (15.0)	BI 67.9 (22.4) UE-FM 41.0 (13.0)	11 (100) ischaemic; 3 (27) cortical, 3 (27) corticosubcortical, 5 (71) subcortical	7 (100) ischaemic; 2 (29) cortical, 1 (14) corticosubcortical, 4 (57) subcortical	Not stated by the authors
Kim 2016	59 (13) years	52 (11) years	15 (6) months	15 (7) months	5 (33) female	6 (40) female	8 (53) left	7 (47) left	FIM 67 (10)	FIM 80 (11)	4 (27) ischaemic/not stated	10 (67) ischaemic/not stated	Not stated by the authors
Ko 2008a	62 (9) years		29-99 days		5 (33) female		15 (100) right		19 per cent deviation (11)		10 (66) ischaemic		15 (100) right-handed
Koo 2018	52 (3) years	59 (3) years	19 (8) months	20 (8) months	7 (58) female	6 (50) female	6 (50) left	8 (75) left	MBI 35 (16)	MBI 38 (20)	4 (33) ischaemic; 3 (25) cortical, 9 (75) subcortical	7 (58) ischaemic;2 (17) cortical, 8 (67) subcortical, 2 (17) brain stem	24 (100) right handed
Klomjai 2018	57 (12) years		3 (2) months		5 (26) female		12 (63) right		TUG 21 (13) s	TUG 20 (13) s	19 (100) ischaemic		16 (84) right-handed

Table 2. Patient characteristics *(Continued)*

Lee 2014	62 (11) years	61 (14) years	18 (8) days	17 (6) days	17 (44) female	9 (45) female	19 (49) left	13 (65)	UE-FM 37 (23)	UE-FM 35 (22)	21 (54) ischaemic; 21 (54) cortical; 18 (46) subcortical	14 (70) ischaemic; 10 (50) cortical; 10 (50) subcortical	Not stated by the authors
Linden-berg 2010	62 (15) years	56 (13) years	31 (21) months	40 (23) months	2 (20) female	3 (30) female	6 (60) left	7 (70) left	UE-FM 38.2 (13.3)	UE-FM 39.8 (11.5)	10 (100) ischaemic	10 (100) ischaemic	19 (95) right-handed, 1 (5) both-handed
Mahmoudi 2011	61 (14) years		8 (5) months		3 (33) female		6 (60) left, 3 (30) right, 1 (10) brainstem		JTT (without handwriting): 12.3 (7.3) s		10 (100) ischaemic		Not stated by the authors
Manji 2018	62 (10) years	64 (11) years	4 (2) months	5 (1) months	5 (33) female	4 (27) female	Not reported		FIM 107 (10)	FIM 104 (10)	9 (60) ischaemic	8 (16) ischaemic	Not stated by the authors
Mazzoleni 2019	68 (16) years	69 (16) years	Not reported		12 (60) female	12 (63) female	11 (55) left	11 (58) left	CMMSA 4.3 (1.4)	CMMSA 5.1 (1.1)	13 (65) ischaemic	16 (84) ischaemic	38 (97) right-handed
Mortensen 2016	66 (11) years	61 (10) years	32 (16) months	29 (15) months	4 (50) female	2 (29) female	4 (50) left	4 (57) left	JTT 69 (29) s	JTT 55 (18) s	0 ischaemic	0 ischaemic	Not stated by the authors
Nair 2011	61 (12) years	56 (15) years	33 (20) months	28 (28) months	2 (29) female	3 (43) female	3 (43) left	5 (71) left	UE-FM 30 (11)	UE-FM 31 (10)	7 (100) ischaemic; 5 (71) cortical and corticosubcortical, 2 (29) subcortical	7 (100) ischaemic; 4 (56) cortical and corticosubcortical, 3 (43) subcortical	14 (100) right-handed
Nicolo 2017	65 (12) years	64 (17) years	1 (0.4) months	1 (0.3) months	13 (46) female	5 (38) female	4 (29) left	5 (36) left	NIHSS 13 (6)	NIHSS 12 (5)	13 (46) ischaemic; 4 (14) cortical, 16 (67) corticosubcortical, 8 (29) subcortical	10 (71) ischaemic; 1 (8) cortical, 6 (46) corticosubcortical, 6 (46) subcortical	39 (95) right-handed
Park 2013	65 (14) years	66 (11) years	29 (19) days	25 (17) days	6 (67) female	2 (40) female	2 (33) left	2 (40) left	NIHSS 8 (3)	NIHSS 10 (3)	4 (67) ischaemic	3 (60) ischaemic	Not stated by the authors

Table 2. Patient characteristics *(Continued)*

Park 2015	59 (6) years	60 (13) years	19 (12) months	24 (16) months	Not reported		9 (56) left	3 (19) left	Gait speed 0.7 (0.3) m/s	Gait speed 0.6 (0.3) m/s	4 (25) ischaemic	4 (50) ischaemic	Not stated by the authors
Picelli 2015	64 (9) years	61 (7) years	57 (35) months	55 (33) months	6 (30) female	2 (20) female	Not reported		6MWT 181 (79) m	6MWT 183 (51) m	7 (35) cortical; 7 (35) corticosubcortical; 6 (30) subcortical	4 (40) cortical; 4 (40) corticosubcortical; 2 (20) subcortical	Not stated by the authors
Qu 2009	45 (11) years	45 (14) years	6 (range 3 to 36) months	4 (range 3 to 12) months	4 (16) female	3 (12) female	14 (56) left	13 (52) left	BI 64 (17)	BI 72 (22)	10 (40) haemorrhagic, 15 (60) infarction	10 (40) haemorrhagic, 15 (60) infarction	Not stated by the authors
Qu 2017	Not described	Not described	Not described	Not described	Not described	Not described	Not described	Not described	Not described	Not described	Not described	Not described	Not described
Rabadi 2017	62 (11) years	63 (6) years	7 (4) days	6 (3) days	0 female	0 female	4 (50) left	2 (25) left	FIM 61 (17)	FIM 59 (12)	8 (100) ischaemic	8 (100) ischaemic	15 (94) right-handed
Rocha 2016	58 (range 41-71) years	59 (range 46-70) years	31 months (range 9-67)	27 months (6-46)	3 (21) female	3 (43) female	8 (57) left	3 (43) left	UE-FM 48 (6)	UE-FM 51 (9)	Not stated by the authors		21 (100) right-handed
Rossi 2013	66 (14) years	70 (14) years	2 days	2 days	13 (52) female	11 (44) female	18 (72) left	16 (64) left	UE-FM 4.1 (6.4)	FM 4.6 (7.8)	25 (100) ischaemic; 1 (4) cortical, 17 (68) corticosubcortical, 7 (28) subcortical	25 (100) ischaemic; 2 (8) cortical, 18 (72) corticosubcortical, 5 (20) subcortical	Not stated by the authors
Saeys 2015	62 (10) years	65 (7) years	46 (22) days	38 (15) days	7 (44) female	7 (47) female	11 (92) left	6 (55) left	Tinetti 8 (7)	Tinetti 9 (6)	15 (94) ischaemic	11 (73) ischaemic	Not stated by the authors
Salazar 2019	60 (10) years	56 (16) years	21 months (range 6-59)	23 months (range 8-59)	5 (33) female	5 (33) female	8 (53) left	8 (53) left	median UE-FM 25 points	median UE-FM 29 (range 16-46)	14 (93) ischaemic	11 (73) ischaemic	27 (90) right handed

Table 2. Patient characteristics *(Continued)*

									(range 9-46)				
Sattler 2015	68 (10) years	63 (12) years	5 (3) days	6 (4) days	3 (30) female	3 (30) female	Not exactly described		NIHSS 3 (1); UE-FM 47 (3)	NIHSS 3 (2), UE-FM 49 (3)	Not exactly described		All patients were right handed
Seo 2017	61 (9) years	63 (9) years	76 (83) months	153 (123) months	2 (18) female	3 (30) female	6 (55) left	2 (20) left	MRS 3 (0.5)	MRS 3 (0.4)	9 (82) ischaemic	7 (70) ischaemic	Not stated by the authors
Shaheiwola 2018	49 (9) years	52 (11) years	18 (15) months (median(IQR))	16(13) months (median(IQR))	1 (7) female	2 (13) female	7 (47) left	9 (60) left	UE-FM 16 (9)	UE-FM 18 (13)	Not exactly described		
Sik 2015	60 (IQR 54-68) years	60 (IQR 55-67) years	22 (32) months (median(IQR))	18 (19) months (median(IQR))	10 (50) female	3 (27) female	10 (50) left	5 (45) left	Not exactly described		19 (95) ischaemic	10 (91) ischaemic	Not stated by the authors
Sohn 2013	58 (15) years		63 (17) days		2 (18) female		6 (55) left		Not stated by the authors		4 (36) ischaemic		Not stated by the authors
Straudi 2016	53 (16) years	64 (10) years	41 (35) weeks	78 (62) weeks	7 (58) female	4 (36) female	9 (75) left	6 (55) left	UE-FM 28 (19)	UE-FM 37 (14)	7 (83) ischaemic; 9 (75) cortical, 3 (25) subcortical	9 (82) ischaemic; 5 (45) cortical, 6 (55) subcortical	Not stated by the authors
Sunwoo 2013a	63 (13) years		28 (60) months		6 (60) female		10 (100) left		MMSE 28 (2)		7 (70) ischaemic		10 (100) right-handed

Table 2. Patient characteristics *(Continued)*

Tahtis 2012	67 (12) years	56 (12) years	20 (5) days	25 (11) days	2 (29) female	1 (14) female	3 (43) left	3 (43) left	MRS 2 (1)	MRS 3 (1)	7 (100) ischaemic; 4 (57) cortical, 3 (43) subcortical	7 (100) ischaemic; 3 (43) cortical; 4 (57) subcortical	Not stated by the authors
Tedesco Triccas 2015b	64 (10) years	63 (14) years	25 (31) months	13 (16) months	5 (42) female	4 (33) female	6 (50) left	5 (45) left	UE-FM 28 (19)	UE-FM 37 (14)	3 (25) ischaemic; 3 (25) cortical, 9 (75) subcortical	9 (81) ischaemic; 4 (36) cortical; 7 (64) subcortical	22 (96) right-handed
Utarapichat 2018	57 (12) years		34 (19) months		4 (40) female		5 (50) left		MRC knee extensor 4		10 (100) ischaemic		Not stated by the authors
Viana 2014	56 (10) years	55 (12) years	32 (18) months	35 (20) months	1 (10) female	3 (30) female	5 (50) left	3 (30) left	UE-FM 41 (16)	UE-FM 39 (17)	9 (90) ischaemic	10 (100) ischaemic	19 (95) right-handed
Wang 2014	54 (14) years	52 (9) years	Not explicitly stated, but all participants were enrolled between 1 and 4 weeks post stroke		1 (16) female	1 (33) female	2 (33) left	0 left	FIM 59 (18)	FIM 74 (8)	6 (100) ischaemic	3 (100) ischaemic	Not stated by the authors
Wong 2015	69 (10) years		11 (5) days		11 (65) female		Not explicitly stated		Not explicitly stated		Not stated by the authors		Not stated by the authors
Wu 2013a	46 (11) years	49 (13) years	5 (3) months	5 (3) months	11 (24) female	10 (22) female	24 (53) left	23 (51) left	BI 55 (range 0 to 85) UE-FM 12.3 (5.5)	BI 55 (range 25 to 95) UE-FM 11.8 (8.2)	27 (60) ischaemic, 18 (40) haemorrhagic	26 (58) ischaemic, 19 haemorrhagic (42)	Not stated by the authors
Yi 2016	62 (11) years	62 (10) years	Not stated		5 (25) female	4 (40) female	None	None	Not stated	Not stated	Not explicitly stated	Not explicitly stated	Not stated by the authors
Yun 2015	60 (14) years	69 (15) years	1.5 (1) months	1.5 (1) months	17 (57) female	8 (53) female	11 (37) left	4 (27) left	Not explicitly stated	Not explicitly stated	Not explicitly stated	Not explicitly stated	Not stated by the authors

BBT: Box and Block Test

BI: Barthel Index
CMMSA: Chedoke McMaster Stroke Assessment
ESS: European Stroke Scale
IQR: Interquartile Range
JTT: Jebsen Taylor Hand Function Test
LACI: lacunar stroke
MRC: Medical Research Council
NA: not applicable
NIHSS: National Institute of Health Stroke Scale
PACI: partial anterior circulation stroke
SD: standard deviation
TACI: total anterior circulation stroke
UE-FM: Upper Extremity Fugl-Meyer Score

Table 3. Demographics of studies, including dropouts and adverse events

Study ID	Type of intervention/ stimulation (polarity)	Electrode position and size	Reference electrode position	Treatment intensity	Base treatment	Dropouts	Adverse events	Source of information
Allman 2016	A-tDCS	5 x 7–cm electrodes, encased in saline-soaked sponges with the anode placed over ipsilesional primary motor cortex (5 cm lateral to Cz: C3) and the cathode over the contralateral supraorbital ridge		1 mA for 20 minutes	Base treatment plus 20 minutes of A-tDCS or sham tDCS	Daily self-administered Graded Repetitive Arm Supplementary Program (GRASP) training for 60 minutes over 9 days	2 (15%) in the EXP group due to organizational issues	Not described explicitely	Published
	Sham tDCS			1 mA for 10 seconds				
Andrade 2017	A-tDCS	6.4 x 2.5 cm anode over premotor cortex	On the supraorbital region in the contralateral hemisphere	0.7 mA (duration not described)	Base treatment plus unknown duration of A-tDCS over PMC or M1 or sham tDCS	CIMT on a 3-hour daily protocol of motor skills training for two weeks, supervised by a blinded physiotherapist (restriction of 90% of waking hours)	None	16 out of 60 patients reported mild side effects after stimulation (7 in the M1 group, 6 in PMC group, and 3 in the sham group):	Published
	A-tDCS	6.4 x 2.5 cm anode over M1							
	Sham tDCS	Not described							

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

								skin redness under the site of stimulation (5 in M1 group, 4 in PMC group, and 3 in sham group), mild headache (3 in M1 group and 2 in PMC group), and sleepiness (1 in PMC group). In all groups some subjects experienced multiple adverse effects.	
Ang 2012	Dual-tDCS Sham tDCS	Saline-soaked sponge electrodes with the anode placed over M1 of the affected hemisphere and the cathode placed over M1 the unaffected hemisphere (size not stated)		1 mA for 20 minutes 1 mA for 30 seconds	20 minutes of dual-tDCS or sham tDCS followed by 8 minutes of evaluation prior to base treatment	60 minutes of therapy using EEG-based MI-BCI with robotic feedback with the MIT-Manus 5 times a week for 2 weeks	None	Unclear	Published
Au-Yeung 2014	A-tDCS C-tDCS	Saline-soaked 35 cm^2 sponge electrodes over the M1 of the lesioned hemisphere Saline-soaked 35 cm^2 sponge electrodes	Over the contralateral supraorbital forehead	1 mA for 20 minutes 1 mA for 20 minutes	A-tDCS, C-tDCS and sham tDCS once in random order with at least 5 days wash-out period	None	None	Unclear	Published

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

		over the M1 of the non-lesioned hemisphere						
	Sham tDCS	Saline-soaked 35 cm² sponge electrodes over M1 of both hemispheres		1 mA for 10 seconds				
Bang 2015	Dual tDCS	Anodal sponge electrode of 35cm² was attached to the right posterior parietal cortex (P4) and accompanied by cathode tDCS of the second circuit was positioned over the left posterior parietal cortex (P3). Therefore, in the first tDCS circuit, the anode was placed over P4 and the cathode was placed over the left supraorbital area		1 mA for 20 minutes	Base treatment either with or without Dual tDCS	Mirror-based feedback training	Not described	Unclear	Published
	Feedback training			NA				
Boggio 2007a	A-tDCS	Saline-soaked 35 cm² sponge electrodes over the M1 of the lesioned hemisphere	Over the contralateral supraorbital forehead	1 mA for 20 minutes	A-tDCS, C-tDCS or sham tDCS 4 days once a day	None	None	None	Published
	C-tDCS	Saline-soaked 35 cm² sponge electrodes over the M1 of the non-lesioned hemisphere							
	Sham tDCS	Not described by the authors		1 mA for 30 seconds					
Bolognini 2011	A-tDCS	Saline-soaked 35 cm² sponge electrodes; with the anode placed over M1 of the lesioned hemisphere and the cathode over M1 of the non-lesioned hemisphere		2 mA for 40 minutes	Base treatment + A-tDCS or sham tDCS 5 days a week for 2 consecutive weeks	CIMT up to 4 hours/day for 5 days a week for 2 consecutive weeks	7 (33%) due to frustration and tiredness during assessments (Bolognini 2013 [pers comm]); these participants have been exclud-	None	Published and unpublished
	Sham tDCS			2 mA for 30 seconds					

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

							ed from analysis and presentation of results		
Cha 2014	A-tDCS	Water-soaked 35 cm^2 sponge electrodes over M1 of the lesioned hemisphere	Over the contralateral supraorbital forehead	1 mA for 20 minutes	Base treatment + A-tDCS for 20 minutes	Basic training for improving function of upper and lower extremities for 30 minutes per day, 5 times a week for four weeks	None	Unclear	Published
	PT	NA		NA	NA				
Chang 2015	A-tDCS	Saline-soaked sponge surface electrodes with the 7 cm^2 anode over the tibialis anterior area of precentral gyrus of affected hemisphere	Saline-soaked sponge surface electrodes with the 28 cm^2 cathode over the contralateral supraorbital area	2 mA for 10 minutes	Base treatment + either A-tDCS or sham tDCS for 20 minutes	Conventional physical therapy	Not reported	Unclear	Published
	Sham tDCS			2 mA for 15 seconds					
Chelette 2014	A-tDCS	35 cm^2 saline-soaked sponge electrodes with the anode over ipsilesional M1	35 cm^2 saline-soaked sponge electrodes with the cathode contralesional supraorbital	1.4 mA for 20 minutes	Either A-tDCS, C-tDCS, dual tDCS or sham tDCS prior to base treatment	3 hours of intensive, task-oriented UE motor training (a modified constraint-based protocol)	Not reported	Unclear	Published
	C-tDCS	35 cm^2 saline-soaked sponge electrodes with the anode contralesional supraorbital	35 cm^2 saline-soaked sponge electrodes with the cathode over contralesional M						
	Dual tDCS	35 cm^2 saline-soaked sponge electrodes with the anode over ipsilesional M1	35 cm^2 saline-soaked sponge electrodes with the cathode						

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

			over contralesional M1						
	Sham tDCS	35 cm² saline-soaked sponge electrodes with the anode over ipsilesional M1	35 cm² saline-soaked sponge electrodes with the cathode contralesional supraorbital	1.4 mA for 30 seconds					
Cho 2017	C-tDCS	35 cm² wet sponge electrodes with the cathode over contralesional M1	35 cm² wet sponge electrodes with the anode contralesional supraorbital	2 mA for 20 minutes	Either base treatment plus C-tDCS or base treatment only daily for 2 weeks	10 Hz and 90% rMT for 5 seconds with a 55-second inter-train interval, 90% of rMT intensity	None	No serious adverse events occured	Published
	rTMS	rTMS over ipsilesiona lM1 of the hand		1000 pulses over 20 min					
Cunningham 2015	A-tDCS	35 cm² saline-soaked sponge electrodes with the anode over ipsilesional PMC and SMA, identified with neuronavigation	35 cm² saline-soaked sponge electrodes with the cathode contralesional supraorbital	1 mA for 30 minutes	A-tDCS or sham tDCS during each rehabilitation session	CIMT for 30 minutes, 3 times per week for 5 weeks with supervision from a physical therapist. Intensive functional exercises were performed via a graded, regimented, feedback-driven approach. Patient-specific goals were emphasized. Patients were asked to restrain the non-paretic upper limb by placing it in a mitt for 2 hours every weekday while performing home exercises. Exercise log was monitored at each session	None	Unclear	Published
	Sham tDCS			1 mA for 30 seconds					

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

D'Agata 2016	rTMS + dual tDCS	Anode over M1 of the lesioned hemisphere and cathode over M1 of the non-lesioned hemisphere	1.5 mA for 20 minutes	1a. group received 10 daily sessions of rTMS for 2 weeks and after a washout period (at least 6 months) 10 daily sessions of dual tDCS + mirror therapy for 2 weeks. 1b. Dual tDCS + mirror therapy group received 10 daily sessions of dual tDCS + mirror therapy for 2 weeks and after a washout period (at least 6 months) they received 10 daily sessions of rTMS for 2 weeks 2. Sham tDCS + mirror therapy group received 10 daily sessions of dual tDCS + mirror therapy for 2 weeks	rTMS@1Hz at 80% rMT for 15 min (900 stimuli) over the non-lesioned M1 of the hand area	Not clearly stated	Unclear	Published
	Dual tDCS + mirror therapy		1.5 mA for 20 minutes		Mirror box training with the plegic hand (3 series of 25 repetitions of 6 different movements)			
	Sham tDCS + mirror therapy		Not described					
Danzl 2012	A-tDCS	25 cm^2 saline-soaked sponge electrodes with the anode over ipsilesional M1 of the leg and the anode over the contralateral supraorbital forehead	2 mA for 20 minutes	A-tDCS or sham tDCS prior to base treatment	Robot-assisted walking training (20 to 40 minutes) 3 times per week for 4 weeks	2 (20%): 1 in the A-tDCS and 1 in the sham group due to knee pain and contractures	None	Published
	Sham tDCS		2 mA for 75 seconds					

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

Di Lazzaro 2014a	Dual-tDCS	Anode over M1 of the lesioned hemisphere and cathode over M1 of the non-lesioned hemisphere		2 mA for 40 minutes	Dual-tDCS or sham tDCS on 5 continuous days	None	None	Unclear	Published
	Sham tDCS			2 mA for 30 seconds					
Di Lazzaro 2014b	Dual-tDCS	Anode over M1 of the lesioned hemisphere and cathode over M1 of the non-lesioned hemisphere		2 mA for 40 minutes	Base treatment + dual-tDCS or sham tDCS on 5 continuous days	CIMT for at least 90% of waking hours, including 1.5 hours per day arm training	None	Unclear	Published
	Sham tDCS			2 mA for 30 seconds					
Fusco 2013a	A-tDCS	Saline-soaked 35 cm^2 sponge electrodes over the M1 of the lesioned hemisphere	Over the contralateral supraorbital forehead	1.5 mA for 15 minutes	1 active tDCS (A-tDCS, C-tDCS, dual-tDCS) and 1 sham tDCS session in 2 consecutive days	None	None	None	Published and unpublished
	C-tDCS	Saline-soaked 35 cm^2 sponge electrodes over the M1 of the non-lesioned hemisphere		1.5 mA for 15 minutes					
	Dual-tDCS	Saline-soaked 35 cm^2 sponge electrodes with the anode over M1 of the lesioned hemisphere and the cathode over M1 of the non-lesioned hemisphere		1.5 mA for 15 minutes					
	Sham tDCS	Not described by the authors							
Fusco 2014	C-tDCS	Saline-soaked 35 cm^2 gel-sponge electrodes with the cathode over M1 of the non-lesioned hemisphere	Above the right shoulder	1.5 mA for 10 minutes	Each participant underwent C-tDCS and sham tDCS on 5 consecutive days each week for 2 weeks prior to a rehabilitative session in randomised order	Patient-tailored motor rehabilitation focusing on recovery of upper limb for 45 minutes twice a day	2 (14%); reasons not described by the authors	Unclear	Published
	Sham tDCS			Not described			1 (7%); emergency transfer to another hospital		

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

Fregni 2005a	A-tDCS	Saline-soaked 35 cm^2 sponge electrodes over the M1 of the lesioned hemisphere	Over the contralateral supraorbital forehead	1 mA for 20 minutes	Each participant underwent A-tDCS, C-tDCS and sham tDCS once, separated by at least 48 hours of rest	None	None	None	Published
	C-tDCS	Saline-soaked 35 cm^2 sponge electrodes over the M1 of the non-lesioned hemisphere		1 mA for 20 minutes					
	Sham tDCS	Not described by the authors		1 mA for 30 seconds					
Geroin 2011	A-tDCS	Saline-soaked 35 cm^2 sponge electrodes over M1 of the lesioned hemisphere	Over the contralateral supraorbital forehead	1.5 mA for 7 minutes	Base treatment + A-tDCS or sham tDCS 5 days a week for 2 consecutive weeks	50-minute training sessions 5 days a week for 2 consecutive weeks, consisting of 20 minutes of robot-assisted gait training and 30 minutes of lower limb strength and joint mobilisation training	None	None	Published
	Sham tDCS			0 mA for 7 minutes					
Hamoudi 2018	A-tDCS	25 cm^2 anode over ipsilesional M1 hotspot	25 cm^2 cathode over the contralateral supraorbital forehead	1.2 mA for 20 minutes	Either base treatment + A-tDCS or sham tDCS or passive control group	Computerised grip strength training for 45 minutesper day for 5 days	No dropouts during intervention phase	1 (6) migraine, 1 (6) tingling sensation of the unaffected hand	Published
	Sham tDCS			1.2 mA for 30 seconds				3 (17) mild headache, 1 (6) phosphene, 1 (6) abdominal pain, 1 (6) retching	
	Passive control group	NA				No base treatment		None	

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

Hatha-iareerug 2019	Dual tDCS	Saline-soaked 35 cm^2 sponge electrodes with the anode over M1 of the lesioned hemisphere	Saline-soaked 35 cm^2 sponge electrodes with the cathode over M1 of the non-lesioned hemisphere	2 mA for 20 minutes	Base treatment + either dual tDCS or electro-acupuncture once a week for 3 weeks	Intensive physical therapy and occupational therapy performed in hourly sessions 3 times per week for 3 weeks	1 (11) dropped out during follow-up	Unclear	Published
	Electro-acupuncture	NA					None		
Hesse 2011	A-tDCS	Saline-soaked 35 cm^2 sponge electrodes over M1 of the lesioned hemisphere	Over the contralateral supraorbital forehead	2 mA for 20 minutes	Base treatment + A-tDCS, C-tDCS or sham tDCS 5 days a week for 6 consecutive weeks	20 minutes of robot-assisted arm training 5 days a week for 6 consecutive weeks	11 (11%); 7 dropouts in the EXP-groups: 1 (14%) during intervention period due to pneumonia and 6 (86%) until 3 months of follow-up (2 deaths due to myocardial infarction and stent surgery, 3 due to being unavailable and 1 due to refusal of further enrolment); 4 dropouts in the CTL group: 3 (75%) due	None	Published
	C-tDCS	Saline-soaked 35 cm^2 sponge electrodes over M1 of the non-lesioned hemisphere		2 mA for 20 minutes					
	Sham tDCS	As in the A-tDCS or the C-tDCS group (changing consecutively)		0 mA for 20 minutes					

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

							to being not available and 1 (25%) due to refusal of further enrolment		
Ilić 2016	A-tDCS Sham tDCS	Saline-soaked 25 cm^2 sponge electrodes over M1 hand area of the lesioned hemisphere	Over the contralateral supraorbital forehead	2 mA for 20 minutes 2 mA for 60 seconds	Base treatment + either A-tDCS or sham tDCS prior	Intensive task oriented training, delivered by OT and consisting of strength training, ROM exercises, manipulation exercises, pinch grip, grasp, release and simulating ADL	1 dropout in the sham group (reason not stated)	None	Published
Jo 2008a	A-tDCS Sham tDCS	Saline-soaked 25 cm^2 sponge electrodes over DLPFC of the non-lesioned hemisphere	Over the contralateral supraorbital forehead	2 mA for 30 minutes 2 mA for 10 seconds	A-tDCS once and sham tDCS once or vice versa, separated by at least 48 hours of resting period	None	None	6 Quote: "Transient aching or burning sensations were reported in six cases, and transient skin redness at the electrode contact site was reported in three cases."	Published
Kang 2008b	A-tDCS	25 cm^2 electrodes over the left DLPFC	Over the contralateral supraorbital forehead	2 mA for 20 minutes	A-tDCS and sham tDCS or vice versa, separated by at least 48 hours of resting period	None	Not described	Unclear	Published

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

	Sham tDCS	25 cm² electrodes over the left DLPFC	Over the contralateral supraorbital forehead	2 mA for 1 minute					
Khedr 2013	A-tDCS	Saline-soaked 35 cm² sponge electrodes, anode over M1 of the lesioned hemisphere	Over the contralateral supraorbital forehead	2 mA for 25 minutes	Base treatment + A-tDCS, C-tDCS or sham tDCS for 6 consecutive days after	Rehabilitation program within 1 hour after each tDCS session, starting with passive movement and range of motion exercise up to active resistive exercise	None	None	Published
	C-tDCS	Saline-soaked 35 cm² sponge electrodes, cathode over M1 of the non-lesioned hemisphere	Over the contralateral supraorbital forehead	2 mA for 25 minutes					
	Sham tDCS	Saline-soaked 35 cm² sponge electrodes, anode over M1 of the lesioned hemisphere	Over the contralateral supraorbital forehead	2 mA for 2 minutes					
Kim 2009	A-tDCS	Saline-soaked 25 cm² sponge electrodes, anode over M1 of the lesioned hemisphere	Over the contralateral supraorbital forehead	1 mA for 20 minutes	Each participant underwent A-tDCS and sham tDCS, separated by at least 24 hours of rest	None	None	None	Published and unpublished
	Sham tDCS			1 mA for 30 seconds					
Kim 2010	A-tDCS	Saline-soaked 25 cm² sponge electrodes over M1 of the lesioned hemisphere (as confirmed by MEP)	Over the contralateral supraorbital forehead	2 mA for 20 minutes	Base treatment + A-tDCS, C-tDCS or sham tDCS 5 days a week for 2 consecutive weeks at the beginning of each therapy session	Occupational therapy according to a standardised protocol aimed at improving paretic hand function for 30 minutes 5 days a week for 2 consecutive weeks	2 of 20; 1 participant discontinued treatment because of dizziness and another because of headache (authors did not state corre-	Two	Published
	C-tDCS	Saline-soaked 25 cm² sponge electrodes over M1 of the non-lesioned hemisphere (confirmed by MEP)	Over the contralateral supraorbital forehead	2 mA for 20 minutes					
	Sham tDCS	Saline-soaked 25 cm² sponge electrodes over M1 of the lesioned	Over the contralateral supraorbital forehead	2 mA for 1 minutes					

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

		hemisphere (confirmed by MEP)					sponding groups)		
Kim 2016	A-tDCS	Saline-soaked 24 cm^2 sponge electrodes over M1 of the lesioned hemisphere	Over the contralateral supraorbital forehead	1 mA for 20 minutes	Base treatment + either A-tDCS or sham tDCS	Traditional occupational therapy treatment	Not described	Unclear	Published
	Sham tDCS			1 mA for 30 seconds					
Ko 2008a	A-tDCS	Saline-soaked 25 cm^2 surface sponge electrodes over right (lesioned) PPC	Over the contralateral supraorbital forehead	2 mA for 20 minutes	A-tDCS once and sham tDCS once or vice versa, separated by at least 48 hours of resting period	None	Not described	None	Published
	Sham tDCS			2 mA for 10 seconds					
Koo 2018	A-tDCS	Saline-soaked 25 cm^2 surface sponge electrodes with the anode over S1 of the affected hemisphere	Over the contralateral supraorbital forehead	1 mA for 20 minutes	A-tDCS or sham tDCS during 10 stimulation sessions over 10 days	None	Not described	None	Published
	Sham tDCS			1 mA for 20 seconds					
Klomjai 2018	Dual tDCS	Saline-soaked sponge-pad electrodes with 35cm^2 surface and electroconductive gel	Anodal tDCS over the M1 of the affected hemisphere and cathodal tDCS over the M1 of the unaffected hemisphere	2 mA for 20 minutes	Dual tDCS once prior to base treatment and sham tDCS once prior to base treatment or vice versa, separated by at least 7 days of resting period	Dose-matched physical therapy for 60 minutes under expert supervision, aiming at improving strength in the lower extrimity	Not described	Unclear	Published
	Sham tDCS			2 mA for 120 seconds					
Lee 2014	C-tDCS	Saline-soaked 25 cm^2 surface sponge electrodes over hand area of M1 of the non-lesioned hemisphere	Over the contralateral supraorbital forehead	2 mA for 20 minutes	20 minutes per day, 5 times per week for 3 weeks	Occupational therapy for 30 minutes per day, 5 times per week for 3 weeks	3 of 42 (7%); 2 medical problems; 1 refused to participate	No major adverse events	Published
						Virtual reality therapy for 30 minutes per day, 5 times per week for 3 weeks			
	Virtual reality	NA		NA	NA	Virtual reality only for 30 minutes	2 of 22 (9%); 1		

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

						per day, 5 times per week for 3 weeks	refused to participate; 1 early discharge		
Linden-berg 2010	Dual-tDCS	Saline-soaked 16.3 cm^2 sponge electrodes with the anode over M1 of the lesioned hemisphere and the cathode over M1 of the non-lesioned hemisphere		1.5 mA for 30 minutes	Base treatment + dual-tDCS or sham tDCS at 5 consecutive sessions on 5 consecutive days	Physical and occupational therapy sessions at 5 consecutive sessions on 5 consecutive days for 60 minutes, including functional motor tasks	None	None	Published
	Sham tDCS			1.5 mA for 30 seconds					
Mahmoudi 2011	A-tDCS1	Saline-soaked 35 cm^2 sponge electrodes, anode over M1 of the lesioned hemisphere	Over the contralateral orbit	1 mA for 20 minutes	Each participant underwent A-tDCS1, A-tDCS2, C-tDCS, dual-tDCS and sham tDCS once with a washout period of at least 96 hours	None	None	Unclear	Published
	A-tDCS2	Saline-soaked 35 cm^2 sponge electrodes, anode over M1 of the lesioned hemisphere	On the contralateral deltoid muscle	1 mA for 20 minutes					
	C-tDCS	Saline-soaked 35 cm^2 sponge electrodes, cathode over M1 of the non-lesioned hemisphere	Over M1 of the lesioned hemisphere	1 mA for 20 minutes					
	Dual-tDCS	Saline-soaked 35 cm^2 sponge electrodes with the anode over M1 of the lesioned hemisphere and the cathode over M1 of the non-lesioned hemisphere		1 mA for 20 minutes					
	Sham tDCS	Not described by the authors		1 mA for 30 seconds					
Manji 2018	A-tDCS	25 cm^2 saline-soaked sponge electrodes with the anode over the SMA of the lesioned hemisphere	Over the inion	1 mA for 20 minutes	Each participant underwent A-tDCS + base treatment or sham tDCS + base treatment in a random	Body-weight-supported treadmill training (BWSTT) with 20% of body weight support for 20	None	Unclear	Published
	Sham tDCS			1 mA for 30 seconds					

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

					order, each once a day for a week	minutes once a day for a week			
Mazzoleni 2019	A-tDCS	35 cm^2 saline-soaked sponge electrodes with the anode over M1 of the lesioned hemisphere	Over the contralateral supraorbital forehead	2 mA for 20 minutes	Base treatment + 20 minutes either A-tDCS or sham tDCS 5 times a week for 6 weeks	Robotic wrist-training with appr. 1000 repetitions per session. The robot provided assistance, if necessary	1 out of 20 (5) in the CTL group dropped out due to robot failure	None	Published
	Sham tDCS			2 mA for 5 seconds					
Mortensen 2016	A-tDCS	35 cm^2 saline-soaked sponge electrodes with the anode over M1 of the lesioned hemisphere	Over the contralateral supraorbital forehead	1.5 mA for 20 minutes	Base treatment + 20 minutes either A-tDCS or sham tDCS on 5 consecutive days	30 minutes of home-based occupational therapy, aiming at activities and functional tasks	1 out of 8 (13) in the CTL group dropped out during worsening of hand function	There were 6 moderate or severe adverse events (3 in the EXP group and 3 in the CTL group, respectively)	Published
	Sham tDCS			1.5 mA for 30 seconds					
Nair 2011	C-tDCS	Saline-soaked sponge electrodes with the cathode over M1 of the lesioned hemisphere	Over the contralateral supraorbital forehead	1 mA for 30 minutes	Base-treatment + C-tDCS or sham tDCS for 5 consecutive daily sessions, each at the beginning of the base treatment sessions	Occupational therapy (PNF; shoulder abduction, external rotation, elbow extension, forearm pronation) for 5 consecutive daily sessions (60 minutes each)	None	None	Published
	Sham tDCS	Not described by the authors		For 30 minutes					
Nicolo 2017	C-tDCS	35 cm^2 saline-soaked sponge electrodes with the cathode over M1 of the lesioned hemisphere	Over the contralateral supraorbital forehead	1 mA for 25 minutes	Base therapy + brain stimulation 3 times per week for 3 weeks during upper extremity functional motor training sessions	30 minutes of active functional motor practice, consisting of patient-tailored exercises	None	None	Published
	Sham (tDCS, cTBS)			1 mA for 30 seconds					
	cTBS	Over non-lesioned M1	N/A	267 bursts, each consisting of 3 pulses at 30 Hz, re-					

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

				peated at inter-burst intervals of 167 ms); 2 stimulation trains of 30 seconds (separated by 15 minutes)					
Park 2013	A-tDCS Sham tDCS	Sponge electrodes with the anode positioned over the bilateral prefrontal cortex	At the non-dominant arm	2 mA for 30 minutes 2 mA for 30 seconds	Base-treatment + A-tDCS or sham tDCS for 5 days a week for approximately 18 days	Computer-assisted cognitive rehabilitation (CACR) with the ComCog program (15 minute attention and 15 minute memory training)	Unclear	None	Published
Park 2015	A-tDCS Sham tDCS	Anode over Cz area of the left parietal lobe [sic]	Over the contralateral supraorbital forehead	2 mA for 15 minutes Not described	Physiotherapy + either A-tDCS or sham tDCS for 3 days a week during 4 weeks	Task related training for weight support ability improvement and stepping strategy Quote: "(1) lifting and maintaining the lower extremity; (2) lifting the heels; (3) lifting the lower extremity over the footstool followed by lowering; (4) lifting the lower extremity and lowering in onto a footstool; (5) walking back and forth over a 3-m distance to a chair; and (6) going back and forth at a constant pace over 10-m distance. The tasks were conducted one-on-one with a physical therapist."	None	None	Published
	PT	N/A							

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

Picelli 2015	A-tDCS	Saline-soaked 35 cm^2 sponge electrodes over M1 of the lesioned hemisphere	Over the contralateral supraorbital forehead	2 mA for 20 minutes	Base treatment + A-tDCS with either cathodal transcutaneous spinal direct current stimulation (tsDCS) or with sham tsDCS	Robot-assisted gait training on a G-EO for 20 minutes, 5 times per week for 2 weeks	None	None	Published
	Sham tDCS			2 mA for 2 minutes	Base treatment + sham tDCS and cathodal tsDCS				
Qu 2009	C-tDCS	Saline-soaked 18 cm^2 sponge electrodes over primary sensorimotor cortex of the lesioned hemisphere	Unclear	0.5 mA for 20 minutes, once a day for 5 consecutive days for 4 weeks		NA	None	None	Published
	PT	NA		Physical therapy according to the Bobath, Brunnstrom and Rood approaches for 40 minutes twice a day for 5 consecutive days for 4 weeks					
Qu 2017	C-tDCS	Not described	Not described	1.0 mA cathodal tDCS for 2 weeks, once a day, once for 20 minutes, 5 days a week	Not described	Not described	Not described	Unclear	Published
	C-tDCS	Not described	Not described	2.0 mA cathodal DCS for two weeks, once a day, once for 20 minutes, 5 days a week					

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

	Sham tDCS	Not described	Not described	Sham tDCS- for 2 weeks, once a day, once for 20 minutes, 5 days a week					
Rabadi 2017	C-tDCS	Saline-soaked 35 cm^2 sponge electrodes over PMC of the non-lesioned hemisphere	Over the contralateral supraorbital forehead	1 mA for 30 minutes	Base therapy + C-tDCS or sham tDCS 30 minutes a day on 5 consecutive days for 2 weeks	4 hours of standard occupational and physical therapy	There were no drop-outs during intervention phase. Until 3 months follow-up 3 dropouts (38) occured in the EXP group and 1 (13) in the CTL group. Reasons were not stated by the authors.	None	Published
	Sham tDCS			1 mA for 30 seconds					
Rocha 2016	A-tDCS	Saline-soaked 35 cm^2 sponge electrodes over M1 of the lesioned hemisphere	Over the contralateral supraorbital forehead	1 mA for 13 minutes	A-tDCS, C-tDCS or sham tDCS 3 times a week for 4 consecutive weeks prior to base therapy	mCIMT (total immobilisation of the non-paretic upper limb and intensive training of the paretic upper limb) for 6 continuous hours each day over 4 weeks plus 1 hour gross and fine motor activities training per day	There were 2 drop-outs in each group (28%) due to unknown reasons	None	Published
	C-tDCS	Saline-soaked 35 cm^2 sponge electrodes over M1 of the non-lesioned hemisphere		1 mA for 9 minutes					
	Sham tDCS	Saline-soaked 35 cm^2 sponge electrodes over M1 of the lesioned hemisphere		1 mA for 30 seconds					

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

Rossi 2013	A-tDCS Sham tDCS	Saline-soaked 35 cm^2 sponge electrodes over M1 of the lesioned hemisphere	Over the contralateral supraorbital forehead	2 mA for 20 minutes 2 mA for 30 seconds	Once a day for 5 consecutive days	Not described by the authors	None	None	Published
Saeys 2015	A-tDCS Sham tDCS	Over the motor cortex (on C4 or C3 of the 10–20 EEG system)	over the intact hemisphere	1.5 mA for 20 minutes Stimulation turned off after 30 seconds	16 x 20-minute sessions (4 times a week for 4 weeks)	Both groups received multidisciplinary regular physical and occupational therapy mainly focused on the neurodevelopmental treatment concept (1 hour daily)	None	None	Published
Salazar 2019	Dual-tDCS Dual sham tDCS	Over the the M1 area (C3 and C4 of the EEG system) Anode electrodes were positioned over the ipsilesional M1 and cathodes over the contralesional M1		Both groups received 10 sessions of concurrent tDCS and FES or sham tDCS and FES during 30 minutes, 5 times a week for 2 weeks		Before each stimulation session, participants had scapular, shoulder, elbow, wrist and finger passive mobilization for approximately 10 min	None	None	Published
Sattler 2015	A-tDCS Sham tDCS	Over the M1 area (at the hotspot of the extensor carpi radialis muscle	Cathode over the contralesional supraorbital region	1.2 mA anodal tDCS Stimulation (same site and same parameters) was turned off after 60 seconds of stimulation	5 consecutive daily sessions for 13 minutes each	rPNS (5 Hz) was delivered to the radial nerve through bipolar round brass electrodes placed in the spiral grove of the paretic side and was applied at the same time as the real or sham tDCS stimulation. It was applied similarly in both active and sham conditions for 13 minutes. The intensity of was adjusted to be below the threshold for	None	None	Published

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

						direct M response (0.7 x MT).			
Seo 2017	A-tDCS Sham tDCS	Over the presumed leg area of the lesioned hemisphere, just lateral to the Cz position according to the 10–20 system	Cathode on the forehead above the contralateral orbit	2 mA for 20 minutes Stimulation intensity was slowly tapered down from 2 to 0 mA over several seconds after initial minute	20 minutes of tDCS for every weekday during 2 weeks (total 10 sessions)	RAGT for 45 minutes after tDCS	None at first follow-up	None	Published
Shaheiwola 2018	A-tDCS Sham tDCS	Primary motor cortex using (abductor pollicis brevis) hot spot)	Cathode on the contralateral symmetrical area of non-lesioned hemisphere	2.0 mA, time of ramp-up: 10 seconds, time of ramp-down: 10 seconds, 20 minutes	5 sessions per week on workdays and a total of 20 sessions during the 4 weeks	60 minutes FES each day	None	None	Published
Sik 2015	A-tDCS g Dual-tDCS Sham tDCS	Anodal tDCS over C3-C4 area of the affected hemisphere Dual-TDCs active electrode to the C3-C4 area of the unaffected hemisphere in addition to its anodal application Sham: electrodes were placed as in the anodal group	Opposite supraorbital region	2 mA, 20 mintes in patients with anodal stimulation --- 2 mA, 40 minutes in the bihemispheric-treated patients (20 minutes anodal tDCS to the lesional hemisphere/20 minutes cathodal tDCS to the non-lesional hemisphere)	tDCS application was started simultaneously with occupational therapy (15 sessions for 3 weeks) Physiotherapy and occupational therapy, (2 hours, including range of motion exercises, strengthening exercises, outreach activities)	5 (2 in A-tDCS group and 2 in bihemispheric group and 1 in sham group)	None	Published

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

Sohn 2013	A-tDCS	25 cm^2 sponge electrodes over M1 of the affected hemisphere	Not described	2 mA for 10 minutes	A-tDCS or sham tDCS once	None	Unclear	Unclear	Published
	Sham tDCS			2 mA for 20 seconds					
Straudi 2016	Dual-tDCS	Anode was placed on the M1 of the affected hemisphere. Electrodes were located at C3 and C4 according to the 10/20 international EEG system	Cathode on the contralateral M1 area	1 mA for 30 minutes, during RAT		Upper Extremity Robot-Assisted Training	None	No severe adverse events (10 out of 23 reported mild adverse events)	Published
	Sham tDCS			Current was delivered for only 30 seconds and then the current was discontinued, but the tDCS apparatus was left in place for the same time as active tDCS (30 minutes)					
Sunwoo 2013a	Dual-tDCS	Saline-soaked 25 cm^2 sponge electrodes over the right posterior parietal cortex (PPC) plus cathodal tDCS over the left PPC	Over the contralateral supraorbital forehead	1 mA for 20 minutes	Each participant underwent dual-tDCS, A-tDCS and sham tDCS once with a wash-out period of at least 24 hours	None	None	3 (30%) suffered from mild headache after dual-tDCS, which disappeared spontaneously	Published
	A-tDCS	Saline-soaked 25 cm^2 sponge electrodes over the right PPC plus sham tDCS over the left PPC		1 mA for 20 minutes					
	Sham tDCS	Saline-soaked 25 cm^2 sponge electrodes over the right PPC plus		1 mA for 10 seconds					

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

		sham tDCS over the left PPC							
Tahtis 2012	Dual-tDCS Sham tDCS	Saline-soaked 25 cm^2 electrodes with the anode placed over the leg area of the lesioned hemisphere and the cathode placed over leg area of the non-lesioned hemisphere	Not described	2 mA for 15 minutes 2 mA for < 30 seconds	Dual-tDCS or sham tDCS once	None	Unclear	None	Published
Tedesco Triccas 2015b	A-tDCS Sham tDCS	Saline-soaked 35 cm^2 sponge electrodes with the anode placed over M1 of the affected hemisphere	Over the contralateral supraorbital forehead	1 mA for 20 minutes 1 mA for 20 seconds	Base therapy plus tDCS or sham tDCS for 18 sessions during 8 weeks (approximately 2 to 3 sessions per week)	Robotic arm training with the ArmeoSpring device (60 minutes per session) for 18 sessions during 8 weeks (approximately 2 to 3 sessions per week)	1 out of 12 (8%) in the A-tDCS group due to a skin reaction after receiving four sessions of A-tDCS	6 out of 12 (50%) in the A-tDCS group reported adverse events such as pain, burning or headache after receiving A-tDCS	Published/unpublished
Utarapichat 2018	A-tDCS Sham tDCS	Saline-soaked 10 cm^2 sponge electrodes with the anode placed over M1 of the affected hemisphere	Over the contralateral supraorbital forehead	2 mA for 10 minutes 2 mA for 30 seconds	Not described	Not described	None	Unclear	Published
Viana 2014	A-tDCS Sham tDCS	Saline-soaked 35 cm^2 sponge electrodes with the anode placed over M1 of the affected hemisphere	Over the contralateral supraorbital forehead	2 mA for 13 minutes 2 mA for 30 seconds	Base therapy + A-tDCS or sham tDCS 3 times a week for 5 weeks	Virtual reality training using Nintendo Wii (Games used: Wii Sports resort, Wii Play Motion, Let's Tap) aiming at movements of shoulder, elbow, wrist, hand and fingers; each game was played for 15 minutes (total time per training	None	None	Published

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

						session: 60 minutes); passive stretching exercises were performed before and after each training session			
Wang 2014	Dual-tDCS Sham-tDCS	35 cm^2 electrodes with the anode placed over M1 of the affected hemisphere	Over contralateral M1	1 mA for 20 minutes 1 mA for 10 seconds	Dual-tDCS or sham-tDCS once	Placebo methylphenidate 1 hour prior to stimulation 20 mg MP 1 hour prior to stimulation	Unclear	No major adverse events; 3 participants (50%) from the dual-tDCS group reported mild tingling sensation with tDCS stimulation	Published
Wong 2015	A-tDCS 5 consecutive sessions of intensive physiotherapy upper limb training	Over the hand area of primary motor cortex of the affected hemisphere	Cathodal electrode was placed over the contralateral supraorbital area	1 mA tDCS for 20 minutes	Not described	Not described	Not described	Unclear	Published
Wu 2013a	C-tDCS Sham tDCS	Saline-soaked 24.75 cm^2 sponge electrodes over primary sensorimotor cortex of the lesioned hemisphere	Over the shoulder on the unaffected side	1.2 mA for 20 minutes 1.2 mA for 30 seconds	Once daily 5 days a week for 4 weeks	Quote: "Both groups received a conventional physical therapy program for 30 minutes twice daily, including maintaining good limb position, chronic stretch-	None	None	Published

Table 3. Demographics of studies, including dropouts and adverse events *(Continued)*

						ing via casting or splinting, physical modalities and techniques, and movement training"			
Yi 2016	A-tDCS	Over the right PPC (5 cm x 5 cm)	Over Cz	2 mA for 30 minutes	5 sessions per week for 3 weeks	Conventional physical therapy throughout the duration of the 3 weeks	2 out 32 (6%)	None	Published
	C-tDCS	Over the left PPC							
	Sham tDCS	Sham tDCS was performed in the same way as for anodal group		2 mA for 30 minutes					
				Stimulator was turned off after 30 seconds					
Yun 2015	A-tDCS left	At T3 for the left-group and	Unclear	2 mA for 30 minutes	5 times a week for 3 weeks	Not described	None	None	Published
	A-tDCS right								
	Sham tDCS	At T4 for the right-group	Unclear						
		Using the same method as for the left-group,	Unclear						

A-tDCS: anodal direct current stimulation
C-tDCS: cathodal direct current stimulation
CIMT: constraint-induced movement therapy
cTBS: Continuous Theta Burst Stimulation
Dual-tDCS: A-tDCS and C-tDCS simultaneously
EEG: electroencephalography
FES: Functional electrical stimulation
M1: primary Motor Cortex
MEP: motor-evoked potentials
MI-BCI: motor imagery brain-computer interface
MP: methylphenidate
NA: not applicable
PNF: proprioceptive neuromuscular facilitation

PPC: posterior parietal cortex
PT: physical therapy
RAGT: robotic-assisted gait training
rPNS: Repetitive electrical stimulation
SD: standard deviation
tDCS: transcranial direct current stimulation
tsDCS: transcutaneous spinal direct current stimulation

Table 4. Sensitivity analyses for comparison 1.2: primary outcome of ADL performance at the end of follow-up at least 3 months after the end of the intervention period

Sensitivity analysis	Studies included in analysis	Effect estimate
All studies with proper allocation concealment for primary outcome absolute values	Hesse 2011; Khedr 2013; Kim 2010; Tedesco Triccas 2015b	(SMD 0.30, 95% CI -0.15 to 0.75; participants = 199; studies = 4; I^2 = 51%; inverse variance method with random-effects model)
All studies with proper allocation concealment for primary outcome change scores	Rabadi 2017	(SMD 0.19, 95% CI -0.27 to 0.64; participants = 16; studies = 1; I^2 = 0%; inverse variance method with random-effects model)
All studies with proper blinding of outcome assessor for primary outcome	Di Lazzaro 2014b; Hesse 2011; Khedr 2013; Kim 2010; Rossi 2013; Tedesco Triccas 2015b	(SMD 0.31, 95% CI 0.01 to 0.62; participants = 269; studies = 6; I^2 = 27%; inverse variance method with random-effects model)
All studies with intention-to-treat analysis	Di Lazzaro 2014b; Hesse 2011; Khedr 2013; Rossi 2013	(SMD 0.38, 95% CI 0.05 to 0.70; participants = 205; studies = 4; I^2 = 16%; inverse variance method with random-effects model)

CI: confidence interval
SMD: standardised mean difference

APPENDICES

Appendix 1. CENTRAL search strategy

#1 [mh ^"cerebrovascular disorders"] or [mh "basal ganglia cerebrovascular disease"] or [mh "brain ischemia"] or [mh "carotid artery diseases"] or [mh "intracranial arterial diseases"] or [mh "intracranial embolism and thrombosis"] or [mh "intracranial hemorrhages"] or [mh ^stroke] or [mh "brain infarction"] or [mh ^"vertebral artery dissection"]
#2 (stroke or poststroke or "post-stroke" or cerebrovasc* or brain next vasc* or cerebral next vasc* or cva* or apoplex* or SAH):ti,ab
#3 ((brain* or cerebr* or cerebell* or intracran* or intracerebral) near/5 (isch*emi* or infarct* or thrombo* or emboli* or occlus*)):ti,ab
#4 ((brain* or cerebr* or cerebell* or intracerebral or intracranial or subarachnoid) near/5 (haemorrhage* or hemorrhage* or haematoma* or hematoma* or bleed*)):ti,ab
#5 [mh ^hemiplegia] or [mh paresis]
#6 (hemipleg* or hemipar* or paresis or paretic or hemineglect or "hemi-neglect" or ((unilateral or spatial or hemi*spatial or visual) near/5 neglect)):ti,ab
#7 #1 or #2 or #3 or #4 or #5 or #6
#8 [mh ^"Electric Stimulation Therapy"]
#9 [mh ^"Transcranial Direct Current Stimulation"]
#10 [mh ^"Electric Stimulation"]
#11 [mh ^Electrodes]
#12 (transcranial near/5 directcurrent near/5 stimulation):ti,ab
#13 (transcranial near/5 DC near/5 stimulation):ti,ab
#14 (transcranial near/5 electric* near/5 stimulation):ti,ab
#15 (tDCS or A-tDCS or C-tDCS or S-tDCS or electrode* or anode or anodes or anodal or cathode or cathodes or cathodal):ti,ab
#16 #8 or #10 or #11 or #12 or #13 or #14 or #15
#17 #7 and #16

Number of records retrieved in 2019 search: 1035

Appendix 2. MEDLINE (Ovid SP) search strategy

1. cerebrovascular disorders/ or exp basal ganglia cerebrovascular disease/ or exp brain ischemia/ or exp carotid artery diseases/ or exp intracranial arterial diseases/ or exp "intracranial embolism and thrombosis"/ or exp intracranial hemorrhages/ or stroke/ or exp brain infarction/ or vertebral artery dissection/

2. (stroke or poststroke or post-stroke or cerebrovasc$ or brain vasc$ or cerebral vasc$ or cva$ or apoplex$ or SAH).tw.
3. ((brain$ or cerebr$ or cerebell$ or intracran$ or intracerebral) adj5 (isch?emi$ or infarct$ or thrombo$ or emboli$ or occlus$)).tw.
4. ((brain$ or cerebr$ or cerebell$ or intracerebral or intracranial or subarachnoid) adj5 (haemorrhage$ or hemorrhage$ or haematoma$ or hematoma$ or bleed$)).tw.
5. hemiplegia/ or exp paresis/
6. (hemipleg$ or hemipar$ or paresis or paretic or hemineglect or hemi-neglect or ((unilateral or spatial or hemi?spatial or visual) adj5 neglect)).tw.
7. or/1-6
8. electric stimulation therapy/ or transcranial direct current stimulation/
9. Electric Stimulation/
10. Electrodes/
11. (transcranial adj5 direct current adj5 stimulation).tw.
12. (transcranial adj5 DC adj5 stimulation).tw.
13. (transcranial adj5 electric$ adj5 stimulation).tw.
14. (tDCS or A-tDCS or C-tDCS or S-tDCS or electrode$ or anode or anodes or anodal or cathode or cathodes or cathodal).tw.
15. or/8-14
16. Randomized Controlled Trials as Topic/
17. random allocation/
18. Controlled Clinical Trials as Topic/
19. control groups/
20. clinical trials as topic/ or clinical trials, phase i as topic/ or clinical trials, phase ii as topic/ or clinical trials, phase iii as topic/ or clinical trials, phase iv as topic/
21. double-blind method/
22. single-blind method/
23. Placebos/
24. placebo effect/
25. cross-over studies/
26. randomized controlled trial.pt.
27. controlled clinical trial.pt.
28. (clinical trial or clinical trial phase i or clinical trial phase ii or clinical trial phase iii or clinical trial phase iv).pt.
29. (random$ or RCT or RCTs).tw.
30. (controlled adj5 (trial$ or stud$)).tw.
31. (clinical$ adj5 trial$).tw.
32. ((control or treatment or experiment$ or intervention) adj5 (group$ or subject$ or patient$)).tw.
33. (quasi-random$ or quasi random$ or pseudo-random$ or pseudo random$).tw.
34. ((control or experiment$ or conservative) adj5 (treatment or therapy or procedure or manage$)).tw.
35. ((singl$ or doubl$ or tripl$ or trebl$) adj5 (blind$ or mask$)).tw.
36. (cross-over or cross over or crossover).tw.
37. (placebo$ or sham).tw.
38. trial.ti.
39. (assign$ or allocat$).tw.
40. controls.tw.
41. or/16-40
42. 7 and 15 and 41
43. exp animals/ not humans.sh.
44. 42 not 43

45. limit 44 to ed=20130501-20150227

Number of records retrieved in 2019 search: 1654

Appendix 3. EMBASE (Ovid SP) search strategy

1. cerebrovascular disease/ or exp basal ganglion hemorrhage/ or exp brain hematoma/ or exp brain hemorrhage/ or exp brain infarction/ or exp brain ischemia/ or exp carotid artery disease/ or cerebral artery disease/ or exp cerebrovascular accident/ or exp intracranial aneurysm/ or exp occlusive cerebrovascular disease/ or stroke patient/

2. (stroke or poststroke or post-stroke or cerebrovasc$ or brain vasc$ or cerebral vasc$ or cva$ or apoplex$ or SAH).tw.

3. ((brain$ or cerebr$ or cerebell$ or intracran$ or intracerebral) adj5 (isch?emi$ or infarct$ or thrombo$ or emboli$ or occlus$)).tw.

4. ((brain$ or cerebr$ or cerebell$ or intracerebral or intracranial or subarachnoid) adj5 (haemorrhage$ or hemorrhage$ or haematoma$ or hematoma$ or bleed$)).tw.

5. hemiparesis/ or hemiplegia/ or paresis/

6. (hemipleg$ or hemipar$ or paresis or paretic or hemineglect or hemi-neglect or ((unilateral or spatial or hemi?spatial or visual) adj5 neglect)).tw.

7. or/1-6

8. transcranial direct current stimulation/

9. electrostimulation therapy/ or nerve stimulation/ or electrostimulation/

10. electrode/

11. (transcranial adj5 direct current adj5 stimulation).tw.

12. (transcranial adj5 DC adj5 stimulation).tw.

13. (transcranial adj5 electric$ adj5 stimulation).tw.

14. (tDCS or A-tDCS or C-tDCS or S-tDCS or electrode$ or anode or anodes or anodal or cathode or cathodes or cathodal).tw.

15. or/8-14

16. Randomized Controlled Trial/ or "randomized controlled trial (topic)"/

17. Randomization/

18. Controlled clinical trial/ or "controlled clinical trial (topic)"/

19. control group/ or controlled study/

20. clinical trial/ or "clinical trial (topic)"/ or phase 1 clinical trial/ or phase 2 clinical trial/ or phase 3 clinical trial/ or phase 4 clinical trial/

21. Crossover Procedure/

22. Double Blind Procedure/

23. Single Blind Procedure/ or triple blind procedure/

24. placebo/ or placebo effect/

25. (random$ or RCT or RCTs).tw.

26. (controlled adj5 (trial$ or stud$)).tw.

27. (clinical$ adj5 trial$).tw.

28. ((control or treatment or experiment$ or intervention) adj5 (group$ or subject$ or patient$)).tw.

29. (quasi-random$ or quasi random$ or pseudo-random$ or pseudo random$).tw.

30. ((control or experiment$ or conservative) adj5 (treatment or therapy or procedure or manage$)).tw.

31. ((singl$ or doubl$ or tripl$ or trebl$) adj5 (blind$ or mask$)).tw.

32. (cross-over or cross over or crossover).tw.

33. (placebo$ or sham).tw.

34. trial.ti.

35. (assign$ or allocat$).tw.

36. controls.tw.

37. or/16-36

38. 7 and 15 and 37

39. (exp animals/ or exp invertebrate/ or animal experiment/ or animal model/ or animal tissue/ or animal cell/ or nonhuman/) not (human/ or normal human/ or human cell/)

40. 38 not 39

41. limit 40 to dd=20130501-20150227

Number of records retrieved in 2019 search: 3233

Appendix 4. CINAHL search strategy (EBSCO)

S1 .(MH "Cerebrovascular Disorders") OR (MH "Basal Ganglia Cerebrovascular Disease+") OR (MH "Carotid Artery Diseases+") OR (MH "Cerebral Ischemia+") OR (MH "Cerebral Vasospasm") OR (MH "Intracranial Arterial Diseases+") OR (MH "Intracranial Embolism and Thrombosis") OR (MH "Intracranial Hemorrhage+") OR (MH "Stroke") OR (MH "Vertebral Artery Dissections")

S2 .(MH "Stroke Patients") OR (MH "Stroke Units")

S3.TI (stroke or poststroke or post-stroke or cerebrovasc* or brain vasc* or cerebral vasc or cva or apoplex or SAH) or AB (stroke or poststroke or post-stroke or cerebrovasc* or brain vasc* or cerebral vasc or cva or apoplex or SAH)

S4.TI (brain* or cerebr* or cerebell* or intracran* or intracerebral) or AB (brain* or cerebr* or cerebell* or intracran* or intracerebral)

S5.TI (ischemi* or ischaemi* or infarct* or thrombo* or emboli* or occlus*) or AB (ischemi* or ischaemi* or infarct* or thrombo* or emboli* or occlus*)

S6.S4 and S5

S7.TI (brain* or cerebr* or cerebell* or intracerebral or intracranial or subarachnoid) or AB (brain* or cerebr* or cerebell* or intracerebral or intracranial or subarachnoid)

S8.TI (haemorrhage* or hemorrhage* or haematoma* or hematoma* or bleed*) or AB (haemorrhage* or hemorrhage* or haematoma* or hematoma* or bleed*)

S9.S7 and S8

S10 .(MH "Hemiplegia")

S11.TI (hemipleg* or hemipar* or paresis or paretic) or AB (hemipleg* or hemipar* or paresis or paretic)

S12 .(MH "Unilateral Neglect") OR (MH "Unilateral Neglect (Saba CCC)") OR (MH "Unilateral Neglect (NANDA)")

S13.TI ((unilateral or spatial or hemispatial or hemi-spatial or visual) N5 neglect) or AB ((unilateral or spatial or hemispatial or hemi-spatial or visual) N5 neglect)

S14.S1 OR S2 OR S3 OR S6 OR S9 OR S10 OR S11 OR S12 OR S13

S15 .(MH "Electric Stimulation") OR (MH "Electrical Stimulation, Functional") OR (MH "Electrical Stimulation, Neuromuscular") OR (MH "Electrodes")

S16.TI (transcranial N5 direct current N5 stimulation) OR AB (transcranial N5 direct current N5 stimulation)

S17.TI (transcranial N5 electric N5 stimulation) OR AB (transcranial N5 electric N5 stimulation)

S18.TI (tDCS or A-tDCS or C-tDCS or S-tDCS or electrode* or anode or anodes or anodal or cathode or cathodes or cathodal) OR AB (tDCS or A-tDCS or C-tDCS or S-tDCS or electrode* or anode or anodes or anodal or cathode or cathodes or cathodal)

S19.S15 OR S16 OR S17 OR S18

S20 .(MH "Randomized Controlled Trials") or (MH "Random Assignment") or (MH "Random Sample+")

S21 .(MH "Clinical Trials") or (MH "Intervention Trials") or (MH "Therapeutic Trials")

S22 .(MH "Double-Blind Studies") or (MH "Single-Blind Studies") or (MH "Triple-Blind Studies")

S23 .(MH "Control (Research)") or (MH "Control Group") or (MH "Placebos") or (MH "Placebo Effect")

S24 .(MH "Crossover Design") OR (MH "Quasi-Experimental Studies")

S25.PT (clinical trial or randomized controlled trial)

S26.TI (random* or RCT or RCTs) or AB (random* or RCT or RCTs)

S27.TI (controlled N5 (trial* or stud*)) or AB (controlled N5 (trial* or stud*))

S28.TI (clinical* N5 trial*) or AB (clinical* N5 trial*)

S29.TI ((control or treatment or experiment* or intervention) N5 (group* or subject* or patient*)) or AB ((control or treatment or experiment* or intervention) N5 (group* or subject* or patient*))

S30.TI ((control or experiment* or conservative) N5 (treatment or therapy or procedure or manage*)) or AB ((control or experiment* or conservative) N5 (treatment or therapy or procedure or manage*))

S31.TI ((singl* or doubl* or tripl* or trebl*) N5 (blind* or mask*)) or AB ((singl* or doubl* or tripl* or trebl*) N5 (blind* or mask*))

S32.TI (cross-over or cross over or crossover) or AB (cross-over or cross over or crossover)

S33.TI (placebo* or sham) or AB (placebo* or sham)

S34.TI trial

S35.TI (assign* or allocat*) or AB (assign* or allocat*)

S36.TI controls or AB controls

S37.TI (quasi-random* or quasi random* or pseudo-random* or pseudo random*) or AB (quasi-random* or quasi random* or pseudo-random* or pseudo random*)

S38.S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37

S39.S14 AND S19 AND S38

S40.EM 201305-

S41.S39 AND S40

Number of records retrieved in 2019 search: 720

Appendix 5. AMED (OvidSP) search strategy

1. cerebrovascular disorders/ or cerebral hemorrhage/ or cerebral infarction/ or cerebral ischemia/ or cerebrovascular accident/ or stroke/

2. (stroke or poststroke or post-stroke or cerebrovasc$ or brain vasc$ or cerebral vasc$ or cva$ or apoplex$ or SAH).tw.

3. ((brain$ or cerebr$ or cerebell$ or intracran$ or intracerebral) adj5 (isch?emi$ or infarct$ or thrombo$ or emboli$ or occlus$)).tw.

4. ((brain$ or cerebr$ or cerebell$ or intracerebral or intracranial or subarachnoid) adj5 (haemorrhage$ or hemorrhage$ or haematoma$ or hematoma$ or bleed$)).tw.

5. hemiplegia/

6. (hemipleg$ or hemipar$ or paresis or paretic or hemineglect or hemi-neglect or ((unilateral or spatial or hemi?spatial or visual) adj5 neglect)).tw.

7. or/1-6

8. electric stimulation/ or functional electric stimulation/ or electrotherapy/

9. (transcranial adj5 direct current adj5 stimulation).tw.

10. (transcranial adj5 DC adj5 stimulation).tw.

11. (transcranial adj5 electric$ adj5 stimulation).tw.

12. (tDCS or A-tDCS or C-tDCS or S-tDCS or electrode$ or anode or anodes or anodal or cathode or cathodes or cathodal).tw.

13. or/8-12

14. 7 and 13

15. limit 14 to up=201305-201503

Number of records retrieved in 2019 search: 19

Appendix 6. Web of Science search strategy

#1.TS=(stroke or poststroke or post-stroke or cerebrovasc* or brain vasc* or cerebral vasc* or cva* or apoplex* or SAH)

#2.TS=((brain* or cerebr* or cerebell* or intracran* or intracerebral) NEAR/5 (isch$emi* or infarct* or thrombo* or emboli* or occlus*))

#3.TS=((brain* or cerebr* or cerebell* or intracerebral or intracranial or subarachnoid) NEAR/5 (haemorrhage* or hemorrhage* or haematoma* or hematoma* or bleed*))

#4.TS=(hemipleg* or hemipar* or paresis or paretic or hemineglect or hemi-neglect)

#5.TS=((unilateral or spatial or hemi$spatial or visual) NEAR/5 neglect)

#6.#5 OR #4 OR #3 OR #2 OR #1

#7.TS=(transcranial NEAR/5 "direct current" NEAR/5 stimulation)

#8.TS=(transcranial NEAR/5 "DC" NEAR/5 stimulation)

#9.TS=(transcranial NEAR/5 electric* NEAR/5 stimulation)

#10.TS=(tDCS or A-tDCS or C-tDCS or S-tDCS or electrode* or anode or anodes or anodal or cathode or cathodes or cathodal)

#11.#10 OR #9 OR #8 OR #7

#12.TS=(random* or RCT or RCTs)

#13.TS=(controlled NEAR/5 (trial* or stud*))

#14.TS=(clinical* NEAR/5 trial*)

#15.TS=((control or treatment or experiment* or intervention) NEAR/5 (group* or subject* or patient*))

#16.TS=(quasi-random* or quasi random* or pseudo-random* or pseudo random*)

#17.TS=((control or experiment* or conservative) NEAR/5 (treatment or therapy or procedure or manage*))

#18.TS=((singl* or doubl* or tripl* or trebl*) NEAR/5 (blind* or mask*))

#19.TS=(cross-over or cross over or crossover)

#20.TS=(placebo* or sham)

#21.TI=trial

#22.TS=(assign* or allocat*)

#23.TS=controls

#24.#23 OR #22 OR #21 OR #20 OR #19 OR #18 OR #17 OR #16 OR #15 OR #14 OR #13 OR #12

#25.#24 AND #11 AND #6

Number of records retrieved in 2015 search: 996

Appendix 7. PEDro search strategy

Abstract & Title: stroke
Therapy: electrotherapies, heat, cold
Subdiscipline: neurology
Method: clinical trial
(Search terms matched with AND)

New records added since: 01/05/2013

Number of records retrieved in 2019 search: 98

Appendix 8. RehabDATA search strategy

Find results with all of the words: stroke
Where Abstract OR Title contains transcranial OR tDCS

Year of publication between 2013 and 2015

Number of records retrieved in 2019 search: 383

Appendix 9. COMPENDEX and INSPEC via Engineering village

((((((((electric NEAR/5 stimulation?) WN KY) OR ((electrode?) WN KY)) OR ((transcranial NEAR/5 direct NEAR/5 current NEAR/5 stimulation?) WN KY)) OR ((transcranial NEAR/5 DC NEAR/5 stimulation?) WN KY)) OR ((transcranial NEAR/5 electric? NEAR/5 stimulation?) WN KY)) OR ((tdcs OR electrode? OR anod? OR cathod?) WN KY)) AND (1884-2019 WN YR)) AND (((((stroke? OR poststroke? OR cerebr? OR cva? OR apoplex? OR sah) WN KY) OR ((cerebell? OR intracerebral OR subarachnoid) WN KY)) OR ((hemipleg? OR hemipar? OR paresis OR paretic) WN KY)) AND (1884-2019 WN YR))

Number of records retrieved in 2019 search: 402

Appendix 10. WHO trial registry search strategy

WHO International Clinical Trials Registry Platform (http://apps.who.int/trialsearch/);
Condition: stroke
Intervention: tdcs OR transcranial direct current stimulation
Recruitment status is: ALL
Phases are: ALL.
Date of registration is between: 01/02/2015 and 14/01/2019

Appendix 11. ClinicalTrials.gov search strategy

US National Institutes of Health Ongoing Trials Register ClinicalTrials.gov (www.clinicaltrials.gov);
(transcranial direct current stimulation OR tDCS) | Interventional Studies | Brain Infarction OR Intracranial Hemorrhages OR Carotid Artery Diseases OR Brain Ischemia OR Cerebral Hemorrhage OR Cerebrovascular Disorders OR Stroke | First posted from 02/01/2015 to 01/14/2019

WHAT'S NEW

Date	Event	Description
14 January 2020	New search has been performed	We have rerun and expanded the searches to January 2019 and revised the text as appropriate. We have included 67 trials involving 1729 participants in this update compared with 32 trials with 748 participants in the last version of this review from 2015.
14 January 2020	New citation required but conclusions have not changed	The conclusions have not changed: there is evidence of an effect of transcranial direct current stimulation for improving activities of daily living, but not for arm function.

HISTORY

Protocol first published: Issue 2, 2012
Review first published: Issue 11, 2013

Date	Event	Description
28 September 2015	New search has been performed	The scope of the updated review has broadened since the previous version. This was in response to a request from the Cochrane

Date	Event	Description
		Stroke Group to incorporate evidence relating to cognitive function (including neglect) into this update. We have rerun and expanded the searches to February 2015 and revised the text as appropriate. We have included 32 trials involving 748 participants in this update compared with 15 trials with 455 participants in the last version of this review from 2013.
28 September 2015	New citation required and conclusions have changed	The conclusions have changed: there is evidence of an effect of transcranial direct current stimulation for improving activities of daily living, but not for arm function.

CONTRIBUTIONS OF AUTHORS

All review authors contributed to the conception and design of the protocol and approved the final draft of the review.

All review authors participated in all stages of the review. BE was involved in screening titles and abstracts of publications identified by the searches; BE and JM extracted trial and outcome data from the selected trials and analysed outcome data. JM and MP were involved in assessing the methodological quality of the studies. All review authors participated in interpreting the results.

DECLARATIONS OF INTEREST

Two review authors (Jan Mehrholz and Marcus Pohl) were involved in conducting and analysing the largest of the included trials (Hesse 2011).
Bernhard Elsner: none known.
Joachim Kugler: none known.

SOURCES OF SUPPORT

Internal sources

- Gesundheitswissenschaften/Public Health, Medizinische Fakultät Carl Gustav Carus der TU Dresden, Fetscherstr. 74, 01307 Dresden, Germany

  Provided extensive database access and provision of study reports and support in logistics
- Wissenschaftliches Institut, Private Europäische Medizinische Akademie der Klinik Bavaria in Kreischa GmbH, An der Wolfsschlucht 1-2, 01731 Kreischa, Germany

  Provided database access and provided statistical support
- Lehrstuhl Therapiewissenschaften, SRH Hochschule für Gesundheit, Neue Str. 28-30, 07548 Gera, Germany

  Provided database access

External sources

- No sources of support supplied

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

The scope of the review has broadened since the 2016 update. This was in response to a request from the Cochrane Stroke Group to incorporate evidence relating to cognitive function (including neglect) into this update. With this 2020 update, we calculated risk ratios for all binary outcomes, as suggested by the Cochrane Handbook, and updated the secondary outcomes.

INDEX TERMS

Medical Subject Headings (MeSH)

*Activities of Daily Living; Bias; Cognition Disorders [rehabilitation]; Confidence Intervals; Lower Extremity [physiology]; Motor Activity [physiology]; Muscle Strength; Patient Dropouts [statistics & numerical data]; Perceptual Disorders [rehabilitation]; Randomized Controlled Trials as Topic; Recovery of Function; *Stroke Rehabilitation; *Transcranial Direct Current Stimulation; Upper Extremity [physiology]

MeSH check words

Adult; Aged; Female; Humans; Male; Middle Aged