

Supplementary Material

1. Brief description of the non-surgical brain stimulation techniques included in this review

1. Electroconvulsive therapy (ECT)

Electroconvulsive therapy uses an electric current applied to the head which induces a seizure. The procedure is usually undergone 2-3 times per week. The patient is sedated with general anaesthesia and given a muscle relaxant to prevent movement during the procedure [1].

2. Repetitive transcranial magnetic stimulation (rTMS)

Repetitive transcranial magnetic stimulation uses a magnetic field to depolarize superficial neurons leading to action potentials in the brain. First developed in 1985, rTMS has been studied as a treatment for depression, psychosis, anxiety, and other disorders. Unlike ECT in which electrical stimulation is more generalised, rTMS can be targeted to a specific site in the brain. It also does not require the administration of an anaesthetic agent or muscle relaxant [1].

3. Magnetic seizure therapy (MST)

Magnetic seizure therapy borrows certain aspects from both ECT and rTMS. Like rTMS, MST uses magnetic pulses instead of electricity to stimulate a precise target in the brain. However, unlike rTMS, MST aims to induce a seizure like ECT. The pulses are given at a higher frequency than those used in rTMS. Therefore, like ECT, the patient must be anaesthetised and given a muscle relaxant to prevent movement [1].

4. Deep transcranial magnetic stimulation (dTMS)

Deep transcranial magnetic stimulation is similar to rTMS but uses a coil that is designed to achieve effective stimulation of deeper neuronal regions [2].

5. Priming transcranial magnetic stimulation (pTMS)

In pTMS typical low-frequency rTMS is preceded by a low-intensity “priming” stimulation with high frequency to enhance the neural response to the low-frequency stimulation train [3].

6. Synchronised transcranial magnetic stimulation (sTMS)

Instead of trains of high amplitude pulses as used by rTMS, sTMS uses low-amplitude stimulation provided by magnets rotating at the patients individual alpha frequency to entrain the patients oscillatory activity within the brain [4].

7. Theta burst stimulation (TBS)

TBS is another form of rTMS where pulses are applied in bursts of three, usually delivered at a frequency of 50 Hz. This protocol uses fewer pulses and is administered for a shorter duration than typical rTMS paradigms [5]. It has been shown that this protocol can achieve similar antidepressant efficacy whilst taking much less time to administer than standard rTMS protocols [6].

8. Transcranial direct current stimulation (tDCS)

tDCS is a non-invasive brain stimulation modality, which changes cortical tissue excitability as a result of applying a weak (typically 0.5–2 mA) direct current via scalp electrodes overlying targeted cortical areas [7].

2. Search strategy

1. PubMed/MEDLINE:

("depress\$") AND ("transcranial direct current stimulation" OR "tDCS" OR "transcranial magnetic stimulation" OR "TMS" OR "theta burst stimulation" OR "TBS" OR "electroshock therapy" OR "electro therapy" OR "electroconvulsive therapy" OR "shock therapy" OR "convulsive therapy" OR "magnetic seizure therapy" OR MST OR "pTMS" OR "sTMS" OR "dTMS") AND ("attention" OR "memory" OR "orientation" OR "learn\$" OR "concentration" OR "cognit\$" OR "executive function" OR "visuospatial" OR "language" OR "verbal" OR "psychomotor speed" OR "inhibition" OR "neuropsychology" OR "side effect" OR "adverse event" OR "adverse effect"). ab, kw, ti.

2. Embase:

'depress*' AND ('transcranial direct current stimulation' OR 'tDCS' OR 'transcranial magnetic stimulation' OR 'TMS' OR 'theta burst stimulation' OR 'TBS' OR 'electroshock therapy' OR 'electro therapy' OR 'electroconvulsive therapy' OR 'shock therapy' OR 'convulsive therapy' OR 'magnetic seizure therapy' OR 'MST' OR 'pTMS' OR 'sTMS' OR 'dTMS') AND ('attention' OR 'memory' OR 'orientation' OR 'learn*' OR 'concentration' OR 'cognit*' OR 'executive function' OR 'visuospatial' OR 'language' OR 'verbal' OR 'psychomotor speed' OR 'inhibition' OR 'neuropsychology' OR 'side effect' OR 'adverse event' OR 'adverse effect'). ab, kw, ti.

3. PsycINFO:

depress* AND (transcranial direct current stimulation OR tDCS OR transcranial magnetic stimulation OR TMS OR theta burst stimulation OR TBS OR electroshock therapy OR electro therapy OR electroconvulsive therapy OR shock therapy OR convulsive therapy OR magnetic seizure therapy OR MST OR pTMS OR sTMS OR dTMS) AND (attention OR memory OR orientation OR learn* OR concentration OR cognit* OR executive function OR visuospatial OR language OR verbal OR psychomotor speed OR inhibition OR neuropsychology OR side effect OR adverse event OR adverse effect). ab, kw, ti.

4. Cochrane Central Register of Controlled Trials:

((transcranial direct current stimulation):ti,ab,kw OR (tDCS):ti,ab,kw OR (transcranial magnetic stimulation):ti,ab,kw OR (TMS):ti,ab,kw OR (theta burst stimulation):ti,ab,kw OR (TBS):ti,ab,kw OR (electroshock therapy):ti,ab,kw OR (electro therapy):ti,ab,kw OR (electroconvulsive therapy):ti,ab,kw OR (shock therapy):ti,ab,kw OR (convulsive therapy):ti,ab,kw OR (magnetic seizure therapy):ti,ab,kw OR (MST):ti,ab,kw OR (pTMS):ti,ab,kw OR (sTMS):ti,ab,kw OR (dTMS):ti,ab,kw) AND ((depress):ti,ab,kw) AND ((attention):ti,ab,kw OR (memory):ti,ab,kw OR (orientation):ti,ab,kw OR (learn):ti,ab,kw OR (concentration):ti,ab,kw OR (cognit):ti,ab,kw OR (executive function):ti,ab,kw OR (visuospatial):ti,ab,kw OR (language):ti,ab,kw OR (verbal):ti,ab,kw OR (psychomotor speed):ti,ab,kw OR (inhibition):ti,ab,kw OR (neuropsychology):ti,ab,kw OR (side effect):ti,ab,kw OR (adverse event):ti,ab,kw OR (adverse effect):ti,ab,kw)

5. ClinicalTrials.gov:

Condition or disease:	depression
Other terms:	transcranial direct current stimulation, tDCS, transcranial magnetic stimulation, TMS, theta burst stimulation, TBS, electroshock therapy, electro therapy, electroconvulsive therapy, ECT, shock therapy, convulsive therapy, magnetic seizure therapy, MST, pTMS, sTMS, dTMS
Study type:	All studies
Study Results:	All Studies
Status:	All
Age group:	Adult (18-64) & Older adults (65+)

6. OpenGrey:

transcranial direct current stimulation, tDCS, transcranial magnetic stimulation, TMS, theta burst stimulation, TBS, electroshock therapy, electro therapy, electroconvulsive therapy, ECT, shock therapy, convulsive therapy, magnetic seizure therapy, MST, pTMS, sTMS, dTMS

References

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