**Supplemental Table 1: Search Strategy**

Ovid

Database(s): Embase 1988 to 2021 Week 20, Ovid MEDLINE(R) 1946 to Present and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) Daily, APA PsycInfo 1987 to May Week 3 2021, EBM Reviews - Cochrane Central Register of Controlled Trials April 2021, EBM Reviews - Cochrane Database of Systematic Reviews 2005 to May 26, 2021

Search Strategy:

|  |  |
| --- | --- |
| **#** | **Searches** |
| 1 | exp \*Dementia/ |
| 2 | Cognitive Aging/ |
| 3 | \*Mental Recall/ |
| 4 | (dementia\* or alzheimer\* or "lewy bod\*" or (huntington\* adj (chorea or disease)) or (aphasia adj1 progressive) or (frontotempor\* adj1 degeneration) or "mild cognitive impairment" or ((memory or cognitive) adj1 (declin\* or deteriorat\* or degenerat\* or impair\*))).ti,ab,kw. |
| 5 | or/1-4 |
| 6 | \*Transcranial Magnetic Stimulation/ |
| 7 | (((transcranial\* or trans-cranial\*) adj2 stimulat\*) or rTMS or TMS).ti,ab. |
| 8 | or/6-7 |
| 9 | 5 and 8 |
| 10 | (conference abstract or conference review or editorial or erratum or note or addresses or autobiography or bibliography or biography or blogs or comment or dictionary or directory or interactive tutorial or interview or lectures or legal cases or legislation or news or newspaper article or patient education handout or periodical index or portraits or published erratum or video-audio media or webcasts).mp. or conference abstract.st. |
| 11 | 9 not 10 |
| 12 | (exp animals/ or exp nonhuman/) not exp humans/ |
| 13 | ((alpaca or alpacas or amphibian or amphibians or animal or animals or antelope or armadillo or armadillos or avian or baboon or baboons or beagle or beagles or bee or bees or bird or birds or bison or bovine or buffalo or buffaloes or buffalos or "c elegans" or "Caenorhabditis elegans" or camel or camels or canine or canines or carp or cats or cattle or chick or chicken or chickens or chicks or chimp or chimpanze or chimpanzees or chimps or cow or cows or "D melanogaster" or "dairy calf" or "dairy calves" or deer or dog or dogs or donkey or donkeys or drosophila or "Drosophila melanogaster" or duck or duckling or ducklings or ducks or equid or equids or equine or equines or feline or felines or ferret or ferrets or finch or finches or fish or flatworm or flatworms or fox or foxes or frog or frogs or "fruit flies" or "fruit fly" or "G mellonella" or "Galleria mellonella" or geese or gerbil or gerbils or goat or goats or goose or gorilla or gorillas or hamster or hamsters or hare or hares or heifer or heifers or horse or horses or insect or insects or jellyfish or kangaroo or kangaroos or kitten or kittens or lagomorph or lagomorphs or lamb or lambs or llama or llamas or macaque or macaques or macaw or macaws or marmoset or marmosets or mice or minipig or minipigs or mink or minks or monkey or monkeys or mouse or mule or mules or nematode or nematodes or octopus or octopuses or orangutan or "orang-utan" or orangutans or "orang-utans" or oxen or parrot or parrots or pig or pigeon or pigeons or piglet or piglets or pigs or porcine or primate or primates or quail or rabbit or rabbits or rat or rats or reptile or reptiles or rodent or rodents or ruminant or ruminants or salmon or sheep or shrimp or slug or slugs or swine or tamarin or tamarins or toad or toads or trout or urchin or urchins or vole or voles or waxworm or waxworms or worm or worms or xenopus or "zebra fish" or zebrafish) not (human or humans or patient or patients)).ti,ab,hw,kw. |
| 14 | (rat or rats or mice or mouse or murine or pig or pigs or porcine or swine or dog or dogs).ti. |
| 15 | or/12-14 |
| 16 | 11 not 15 |
| 17 | limit 16 to yr="2000 -Current" |
| 18 | limit 17 to english language [Limit not valid in CDSR; records were retained] |
| 19 | limit 17 to no language specified [Limit not valid in APA PsycInfo,CDSR; records were retained] |
| 20 | 18 or 19 |
| 21 | remove duplicates from 20 |

SCOPUS

( ( ( ( ( TITLE-ABS-KEY ( dementia\* OR alzheimer\* OR "lewy bod\*" OR ( huntington\* W/ ( chorea OR disease ) ) OR ( aphasia W/1 progressive ) OR ( frontotempor\* W/1 degeneration ) OR ( ( memory OR cognitive OR cognition ) W/2 ( declin\* OR deficit\* OR defect\* OR deteriorat\* OR degenerat\* OR impair\* ) ) ) ) AND ( TITLE-ABS-KEY ( ( ( transcranial\* OR trans-cranial\* ) adj2 AND stimulat\* ) OR rtms OR tms ) ) ) AND NOT ( INDEX ( embase ) OR INDEX ( medline ) OR PMID ( 0\* OR 1\* OR 2\* OR 3\* OR 4\* OR 5\* OR 6\* OR 7\* OR 8\* OR 9\* ) ) ) AND NOT ( DOCTYPE ( ed ) OR DOCTYPE ( bk ) OR DOCTYPE ( er ) OR DOCTYPE ( no ) OR DOCTYPE ( sh ) OR DOCTYPE ( ch ) ) ) AND ( LANGUAGE ( english ) AND PUBYEAR > 1999 ) ) AND NOT ( ( TITLE-ABS-KEY ( ( alpaca OR alpacas OR amphibian OR amphibians OR animal OR animals OR antelope OR armadillo OR armadillos OR avian OR baboon OR baboons OR beagle OR beagles OR bee OR bees OR bird OR birds OR bison OR bovine OR buffalo OR buffaloes OR buffalos OR "c elegans" OR "Caenorhabditis elegans" OR camel OR camels OR canine OR canines OR carp OR cats OR cattle OR chick OR chicken OR chickens OR chicks OR chimp OR chimpanze OR chimpanzees OR chimps OR cow OR cows OR "D melanogaster" OR "dairy calf" OR "dairy calves" OR deer OR dog OR dogs OR donkey OR donkeys OR drosophila OR "Drosophila melanogaster" OR duck OR duckling OR ducklings OR ducks OR equid OR equids OR equine OR equines OR feline OR felines OR ferret OR ferrets OR finch OR finches OR fish OR flatworm OR flatworms OR fox OR foxes OR frog OR frogs OR "fruit flies" OR "fruit fly" OR "G mellonella" OR "Galleria mellonella" OR geese OR gerbil OR gerbils OR goat OR goats OR goose OR gorilla OR gorillas OR hamster OR hamsters OR hare OR hares OR heifer OR heifers OR horse OR horses OR insect OR insects OR jellyfish OR kangaroo OR kangaroos OR kitten OR kittens OR lagomorph OR lagomorphs OR lamb OR lambs OR llama OR llamas OR macaque OR macaques OR macaw OR macaws OR marmoset OR marmosets OR mice OR minipig OR minipigs OR mink OR minks OR monkey OR monkeys OR mouse OR mule OR mules OR nematode OR nematodes OR octopus OR octopuses OR orangutan OR "orang-utan" OR orangutans OR "orang-utans" OR oxen OR parrot OR parrots OR pig OR pigeon OR pigeons OR piglet OR piglets OR pigs OR porcine OR primate OR primates OR quail OR rabbit OR rabbits OR rat OR rats OR reptile OR reptiles OR rodent OR rodents OR ruminant OR ruminants OR salmon OR sheep OR shrimp OR slug OR slugs OR swine OR tamarin OR tamarins OR toad OR toads OR trout OR urchin OR urchins OR vole OR voles OR waxworm OR waxworms OR worm OR worms OR xenopus OR "zebra fish" OR zebrafish ) AND NOT ( human OR humans OR patient OR patients ) ) ) )

**Supplemental Table 2: Full text articles reviewed and excluded, with reasons (n=219)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| # | Title | Authors | Published Year | Journal | Notes |
|  | [Title] Effects of transcranial magnetic stimulation (TMS) and cognitive training for Alzheimer patients; [Scientific title] Testing the effects of TMS stimulation and cognitive training for Alzheimer patients: a pilot study |  | 2009 | Http://www.clinicaltrials.gov | Exclusion reason: Clinical Trials listing; |
|  | A comparative study of high-frequency repetitive transcranial magnetic stimulation(rTMS) combined with treadmill training and treadmill training only on walking speed and balance in chronic stroke patients: a double-blind randomized controlled trial | Tctr | 2021 | https://trialsearch.who.int/Trial2.aspx?TrialID=TCTR20210717001. | Exclusion reason: Clinical Trials listing; |
|  | A randomised controlled trial of acute and maintenance Theta Burst Stimulation for mild to moderate Alzheimer's | Actrn | 2021 | https://trialsearch.who.int/Trial2.aspx?TrialID=ACTRN12621000620820. | Exclusion reason: Clinical Trials listing; |
|  | A randomized controlled feasibility and safety study of deep transcranial magnetic stimulation | Levkovitz Y, Roth Y. Harel E. V. Braw Y. Sheer A. Zangen A. | 2007 | Clinical Neurophysiology | Exclusion reason: TMS as Diagnostic; |
|  | A randomized controlled trial of Theta Burst Stimulation for the treatment of mild to moderate Alzheimer's disease | Actrn, | 2015 | http://www.anzctr.org.au/ACTRN12615000992505.aspx | Exclusion reason: Clinical Trials listing; |
|  | A Randomized Double-blind Controlled Study of Repetitive Transcranial Magnetic Stimulation for the Treatment of Cognitive Impairment Such as Working Memory in Schizophrenia | Nct, | 2013 | https://clinicaltrials.gov/show/NCT01940939 | Exclusion reason: Clinical Trials listing; |
|  | A Role for the Left Angular Gyrus in Episodic Simulation and Memory | Thakral, Preston P.; Madore, Kevin P.; Schacter, Daniel L. | 2017 | The Journal of neuroscience : the official journal of the Society for Neuroscience | Exclusion reason: Wrong population; |
|  | Abstract #71: effects of repetitive transcranial magnetic stimulation on cognition and neuroplasticity in subacute stroke patients | Kim, Y. W. | 2019 | Brain Stimulation | Exclusion reason: Abstract without outcomes data; |
|  | Abstract #77: repetitive Transcranial Magnetic Stimulation (rTMS) in chronic diffuse axonal injury: a randomized controlled trial | Hayashi C, Neville I. S. Rodrigues P. Galhardoni R. R.  et al. | 2019 | Brain Stimulation | Exclusion reason: Abstract without outcomes data; |
|  | Age-related decline of neuroplasticity to intermittent theta burst stimulation of the lateral prefrontal cortex and its relationship with late-life memory performance | Goldsworthy, Mitchell R.; Rogasch, Nigel C.; Ballinger, Sophie; et al. | 2020 | Clinical neurophysiology : official journal of the International Federation of Clinical Neurophysiology | Exclusion reason: TMS as Diagnostic; |
|  | Age-related differences in default-mode network connectivity in response to intermittent theta-burst stimulation and its relationships with maintained cognition and brain integrity in healthy aging | Abellaneda-Perez, Kilian; Vaque-Alcazar, Lidia; Vidal-Pineiro, Didac; et al. | 2019 | NeuroImage | Exclusion reason: Wrong population; |
|  | Altered parietal-motor connections in Alzheimer's disease patients | Bonni, Sonia; Lupo, Federica; Lo Gerfo, Emanuele; et al. | 2013 | Journal of Alzheimer's disease : JAD | Exclusion reason: TMS as Diagnostic; |
|  | Altered response to rTMS in patients with Alzheimer's disease | Inghilleri, M.; Conte, A.; Frasca, V.; et al. | 2006 | Clinical neurophysiology : official journal of the International Federation of Clinical Neurophysiology | Exclusion reason: TMS as Diagnostic; |
|  | Altered speech-related cortical network in frontotemporal dementia | Suppa, Antonio; Fabbrini, Andrea; Guerra, Andrea;  et al. | 2020 | Brain Stimulation | Exclusion reason: TMS as Diagnostic; |
|  | Amyloid-Mediated Cholinergic Dysfunction in Motor Impairment Related to Alzheimer's Disease | Schirinzi, Tommaso; Di Lorenzo, Francesco; Sancesario, Giulia Maria; et al. | 2018 | Journal of Alzheimer's disease : JAD | Exclusion reason: TMS as Diagnostic; |
|  | Aphasia and cognitive impairment decrease the reliability of rnTMS language mapping | Schwarzer, Vera; Bahrend, Ina; Rosenstock, Tizian; et al. | 2018 | Acta neurochirurgica | Exclusion reason: TMS as Diagnostic; |
|  | APOE Status Modulates the Changes in Network Connectivity Induced by Brain Stimulation in Non-Demented Elders | Cleofé Peña-Gomez, Cristina Solé-Padullés, Imma C. Clemente, et al. | 2012 | PLoS ONE | Exclusion reason: Wrong outcomes; |
|  | Application of Neuromodulation Technology Combined with Cognitive Nursing in the Treatment of Alzheimer's Disease | ChiCtr, | 2018 | http://www.who.int/trialsearch/Trial2.aspx?TrialID=ChiCTR1800016077 | Exclusion reason: Clinical Trials listing; |
|  | Application of Neuromodulation Technology in Alzheimer's Disease | ChiCtr | 2019 | https://trialsearch.who.int/Trial2.aspx?TrialID=ChiCTR1900021067. | Exclusion reason: Clinical Trials listing; |
|  | Application of TMS Coupled With VR for Slowing the Rate of Cognitive Decline in Patients With Alzheimer's Disease | Nct, | 2020 | Application of Transcranial Magnetic Stimulation Coupled With Virtual Reality for Slowing the Rate of Cognitive Decline in Patients With Alzheimer's Disease | Exclusion reason: Clinical Trials listing; |
|  | Applying Non-invasive Brain Stimulation in Alzheimer's Rehabilitation | Nct | 2021 | https://clinicaltrials.gov/show/NCT04866979 | Exclusion reason: Clinical Trials listing; |
|  | Assessing the association between electrical stimulation dose, subsequent cognitive function and depression severity in patients receiving bilateral electroconvulsive therapy for major depressive disorder | Sinclair, Jenny Elisabeth; Fernie, Gordon; Bennett, Daniel Mark; et al. | 2016 | The Journal of ECT | Exclusion reason: TMS as diagnostic; |
|  | Assessment of Effectiveness and Safety of Transcranial Magnetic Stimulation (rTMS) Combined With Transcranial Direct Current Stimulation (tDCS) in Dementia Treatment in Alzheimer's Disease | Nct, | 2021 | Assessment of Effectiveness and Safety of Transcranial Magnetic Stimulation (rTMS) Combined With Transcranial Direct Current Stimulation (tDCS) in Dementia Treatment in Alzheimer's Disease | Exclusion reason: Clinical Trials listing; |
|  | Association of Cortical Hyperexcitability and Cognitive Impairment in Patients With Amyotrophic Lateral Sclerosis | Higashihara, Mana; Pavey, Nathan; van den Bos, Mehdi; et al. | 2021 | Neurology | Exclusion reason: TMS as Diagnostic; |
|  | BDNF Val66Met gene polymorphism modulates brain activity following rTMS-induced memory impairment | Abellaneda-Perez, Kilian; Martin-Trias, Pablo; Casse-Perrot, Catherine; et al. | 2022 | Scientific Reports | Exclusion reason: Wrong population; |
|  | Causal role of prefrontal cortex in strengthening of episodic memories through reconsolidation | Sandrini, Marco; Censor, Nitzan; Mishoe, Jonathan; Cohen, Leonardo G. | 2013 | Current biology : CB | Exclusion reason: Wrong population; |
|  | Cerebellar rTMS Theta Burst for Postural Instability in Progressive Supranuclear Palsy | Nct, | 2020 | Cerebellar rTMS Theta Burst for Postural Instability in Progressive Supranuclear Palsy: a Double Blind Cross-over Sham-controlled Study Using Wearing Sensors Technology | Exclusion reason: Clinical Trials listing; |
|  | Cerebellar theta burst stimulation modulates short latency afferent inhibition in Alzheimer's disease patients | Di Lorenzo, Francesco; Ponzo, Viviana; Bonni, Sonia; et al. | 2013 | Frontiers in Aging Neuroscience | Exclusion reason: Wrong outcomes; |
|  | Cholinergic circuitry functioning in patients with vascular cognitive impairment--no dementia | Bella, Rita; Cantone, Mariagiovanna; Lanza, Giuseppe; et al. | 2016 | Brain Stimulation | Exclusion reason: Lack of complete outcome data; |
|  | Cholinergic cortical circuits in Parkinson's disease and in progressive supranuclear palsy: a transcranial magnetic stimulation study | Nardone, Raffaele; Florio, Igor; Lochner, Piergiorgio; Tezzon, Frediano | 2005 | Experimental brain research | Exclusion reason: Wrong outcomes; |
|  | Cholinergic dysfunction and amnesia in patients with Wernicke-Korsakoff syndrome: a transcranial magnetic stimulation study | Nardone, Raffaele; Bergmann, Jurgen; De Blasi, Pierpaolo; et al. | 2010 | Journal of neural transmission (Vienna, Austria : 1996) | Exclusion reason: TMS as Diagnostic; |
|  | Clinical and Electrophysiological Hints to TMS in De Novo Patients with Parkinson's Disease and Progressive Supranuclear Palsy | Fisicaro, Francesco; Lanza, Giuseppe; Cantone, Mariagiovanna; et al. | 2020 | Journal of personalized medicine | Exclusion reason: TMS as Diagnostic; |
|  | Clinical and Neurochemical Effects of Transcranial Magnetic Stimulation (TMS) in Multiple Sclerosis: A Study Protocol for a Randomized Clinical Trial | Aguera, Eduardo; Caballero-Villarraso, Javier; Feijoo, Montserrat; et al. | 2020 | Frontiers in neurology | Exclusion reason: Protocol only; |
|  | Cognitive effects of highfrequency repetitive transcranial magnetic stimulation in Alzheimer's disease: a pilot clinical study | Zhang M, Feng Xia Z. Zhang F. Qin Y. Huang X. | 2017 | Alzheimer's & dementia | Exclusion reason: Abstract without outcomes data; |
|  | Cognitive Enhancement in Healthy Elderly People | Nct | 2021 | https://clinicaltrials.gov/show/NCT04997226 | Exclusion reason: Clinical Trials listing; |
|  | Cognitive function and cholinergic transmission in patients with subcortical vascular dementia and microbleeds: a TMS study | Nardone, Raffaele; De Blasi, Pierpaolo; Seidl, Martin et al. | 2011 | Journal of neural transmission (Vienna, Austria : 1996) | Exclusion reason: Wrong outcomes; |
|  | Cognitive functioning after repetitive transcranial magnetic stimulation (rTMS) in patients with cerebrovascular disease without dementia | Sedlackova S, Rektorova I. Telecka S. Fanfrdlova Z. Rektor I. | 2005 | European Journal of Neurology | Exclusion reason: Abstract without outcomes data; |
|  | Cognitive remediation (CR) combined with transcranial magnetic stimulation (TMS) in Alzheimer's disease (AD) | Schilberg L, Brem A. K. Freitas C. Atkinson N. Vidrin I. Asboth L.; et al., | 2012 | Annals of Neurology | Exclusion reason: Abstract without outcomes data; |
|  | Contributions from the left PMd and the SMA during sequence retrieval as determined by depth of training | Wymbs, Nicholas F.; Grafton, Scott T. | 2013 | Experimental brain research | Exclusion reason: TMS as Diagnostic; |
|  | Cortical afferent inhibition is reduced in patients with idiopathic REM sleep behavior disorder and cognitive impairment: a TMS study | Nardone, Raffaele; Bergmann, Jurgen; Kunz, Alexander; et al. | 2012 | Sleep medicine | Exclusion reason: TMS as Diagnostic; |
|  | Cortical excitability changes as a marker of cognitive impairment in Parkinson's disease | Kamble, Nitish; Bhattacharya, Amitabh; Hegde, Shantala; et al. | 2022 | Behavioural Brain Research | Exclusion reason: Wrong outcomes; |
|  | Cortical excitability in very mild Alzheimer's disease: a long-term follow-up study | Olazaran, J.; Prieto, J.; Cruz, I.; Esteban, A. | 2010 | Journal of neurology | Exclusion reason: TMS as Diagnostic; |
|  | Cortical hyperexcitability in patients with C9ORF72 mutations: Relationship to phenotype | Schanz, Olivia; Bageac, Devin; Braun, Laura; Traynor, Bryan J.; Lehky, Tanya J.; Floeter, Mary Kay | 2016 | Muscle & nerve | Exclusion reason: TMS as Diagnostic; |
|  | Cortico-Hippocampal Brain Connectivity-Guided Repetitive Transcranial Magnetic Stimulation Enhances Face-Cued Word-Based Associative Memory in the Short Term | Wang, He; Jin, Jingna; Cui, Dong; Wang, Xin; Li, Ying; Liu, Zhipeng; Yin, Tao | 2020 | Frontiers in Human Neuroscience | Exclusion reason: Wrong population; |
|  | Decoding the radiomic features of dorsolateral prefrontal cortex in individuals with accelerated cortical changes: implications for personalized transcranial magnetic stimulation | Lu, Hanna; Li, Jing; Chan, Sandra Sau Man; Yue, Winny Wing Yin; Lam, Linda Chiu Wa | 2023 | Journal of Medical Imaging | Exclusion reason: Wrong outcomes; |
|  | Deep repetitive transcranial magnetic stimulation with H-coil in Alzheimer's disease: a double-blind, placebo-controlled pilot study | Coppi E, Ferrari L. Nuara A. Chieffo R. Houdayer E. et al. | 2015 | European Journal of Neurology | Exclusion reason: Abstract without outcomes data; |
|  | Deep TMS for Comorbid Depression and Cognitive Impairment in Older Adults | Nct, | 2018 | Treatment of Comorbid Depression and Cognitive Impairment in Older Adults With Alzheimer's Disease Using Deep Transcranial Magnetic Stimulation (dTMS) | Exclusion reason: Clinical Trials listing; |
|  | Deep TMS for the Treatment of Patients With Parkinson's Disease and Progressive Supranuclear Palsy | Nct, | 2016 | The Use of Deep TMS for the Treatment and Rehabilitation of Patients With Parkinson's Disease and Progressive Supranuclear Palsy | Exclusion reason: Clinical Trials listing; |
|  | Deep Transcranial Magnetic Stimulation for the Treatment of Treatment Resistance Schizophrenia | Nct, | 2020 | Deep Transcranial Magnetic Stimulation for the Treatment of Treatment Resistance Schizophrenia: a Double-Blind, Randomized Clinical Trial | Exclusion reason: Clinical Trials listing; |
|  | Deep Transcranial Magnetic Stimulation for Treatment of Alzheimer's Disease | Nct, | 2010 | Phase 2 Study of Trans Cranial Magnetic Stimulation as Additional Therapy Patients With Alzheimer's Disease | Exclusion reason: Clinical Trials listing; |
|  | Deep Transcranial Magnetic Stimulation in Patients With Alzheimer's Disease | Nct, | 2008 | Phase 2 (Feasibility) Study of Transcranial Magnetic Stimulation as Additional Therapy to Drug Treatment in Patients With Alzheimer's Disease | Exclusion reason: Clinical Trials listing; |
|  | Determinants of Inter-Individual Variability in Corticomotor Excitability Induced by Paired Associative Stimulation | Minkova, Lora; Peter, Jessica; Abdulkadir, Ahmed; et al. | 2019 | Frontiers in neuroscience | Exclusion reason: Wrong outcomes; |
|  | Distinct Pattern of Gray Matter Atrophy in Mild Alzheimer's Disease Impacts on Cognitive Outcomes of Noninvasive Brain Stimulation | Anderkova, Lubomira; Eliasova, Ilona; Marecek, Radek; Janousova, Eva; Rektorova, Irena | 2015 | Journal of Alzheimer's disease : JAD | Exclusion reason: Lack of complete outcome data; |
|  | Distractibility during episodic retrieval is exacerbated by perturbation of left ventrolateral prefrontal cortex | Wais, Peter E.; Kim, Olivia Y.; Gazzaley, Adam | 2012 | Cerebral cortex (New York, N.Y. : 1991) | Exclusion reason: Wrong population; |
|  | Dorsolateral prefrontal cortex excitability abnormalities in Alzheimer's Dementia: Findings from transcranial magnetic stimulation and electroencephalography study | Joseph, Shaylyn; Knezevic, Dunja; Zomorrodi, Reza; et al. | 2021 | International Journal of Psychophysiology | Exclusion reason: TMS as Diagnostic; |
|  | Effect of High Frequency/Low Intensity Transcranial Magnetic Stimulation in Cognitive Traits of an Elderly Population of Subjects With Mild Cognitive Impairment and Mild Dementia | Nct, | 2019 | Effect of High Frequency/Low Intensity Transcranial Magnetic Stimulation in Cognitive Traits of an Elderly Population of Subjects With Mild Cognitive Impairment and Mild Dementia: a Randomized, Double Blind, Parallel Group, Sham Controlled Clinical Trial | Exclusion reason: Clinical Trials listing; |
|  | Effect of NeuroAD on Alzheimer Patients | Nct, | 2013 | Effect of NeuroAD, Combined TMS Stimulation and Cognitive Training, on the Cognitive Function of Mild to Moderate Alzheimer Patients | Exclusion reason: Clinical Trials listing; |
|  | Effect of NeuroAD, combined TMS stimulation and cognitive training, on the cognitive function of mild to moderate Alzheimer patients | Nct, | 2013 | Clinicaltrials.gov [http://clinicaltrials.gov] | Exclusion reason: Clinical Trials listing; |
|  | Effect of repetitive transcranial magnetic stimulation on the cognitive impairment induced by sleep deprivation: a randomized trial | Li S, Zhou H. Yu Y. Lyu H. Mou T. Shi G. Hu S. Huang M. Hu J. Xu Y. | 2020 | Sleep medicine | Exclusion reason: Wrong population; |
|  | Effect of rTMS in patients with Alzheimer's disease: A sham controlled study | Yadav, Ganga Ram | 2021 | Dissertation Abstracts International: Section B: The Sciences and Engineering | Exclusion reason: Abstract without outcomes data; |
|  | Effect of Theta-Burst Transcranial Magnetic Stimulation (TBS) for Early Alzheimer's Disease | Nct, | 2018 | Investigating the Effect of Theta-Burst Transcranial Magnetic Stimulation (TBS) add-on Treatment for Early Alzheimer's Disease | Exclusion reason: Clinical Trials listing; |
|  | Effects of a Combined Transcranial Magnetic Stimulation (TMS) and Cognitive Training in Alzheimer Patients | Nct, | 2011 | Effects of a Combined TMS and Cognitive Training in Alzheimer Patients: a Single-Center, Randomized, Double-Blind, Placebo-Controlled Study | Exclusion reason: Clinical Trials listing; |
|  | Effects of a combined transcranial magnetic stimulation (TMS) and cognitive training in alzheimer patients: safety results of medical device pivotal multi-center study | Tousi B, Pascual-Leone A. Sadowsky C.  et al. | 2017 | Neurodegenerative diseases | Exclusion reason: Abstract without outcomes data; |
|  | Effects of Cerebellar Theta Burst Stimulation on Contralateral Motor Cortex Excitability in Patients with Alzheimer's Disease | Di Lorenzo, Francesco; Bonni, Sonia; Picazio, Silvia; et al. | 2020 | Brain Topography | Exclusion reason: Wrong outcomes; |
|  | Effects of different frequencies of repetitive transcranial magnetic stimulation for cognitive impairment after stroke and the mechanism of neural reorganization | Chi, Ctr Ipr | 2017 | http://www.who.int/trialsearch/Trial2.aspx?TrialID=ChiCTR-IPR-17011908 | Exclusion reason: Clinical Trials listing; |
|  | Effects of high-frequence transcranial magnetic stimulation on cognition of elderly with cognitive impairment no-dementia (CIND) | Marcolin Ma, Drumond Marra H. L. Myckowski M. L. Memoria C. M. Arnaut D. Forlenza O. V. | 2012 | International journal of neuropsychopharmacology | Exclusion reason: Abstract without outcomes data; |
|  | Effects of rTMS on Human Brain Activity | Nct, | 2020 | Effects of rTMS on Human Brain Activity Measured With fMRI | Exclusion reason: Clinical Trials listing; |
|  | Effects of rTMS on the Cognition of Elderly With Mild Memory Complaints | Nct, | 2010 | Effects of rTMS on the Cognition of Elderly With Cognitive Impairment no Dementia ( CIND ) | Exclusion reason: Clinical Trials listing; |
|  | Effects of Transcranial Magnetic Stimulation (TMS) and Cognitive Training for Alzheimer Patients | Nct, | 2009 | Testing the Effects of TMS Stimulation and Cognitive Training for Alzheimer Patients: a Pilot Study | Exclusion reason: Clinical Trials listing; |
|  | Efficacy and Safety Analysis of Risperidone and rTMS Drugs in the Treatment of Alzheimer's Disease with Psychobehavioral Symptoms | Yin, G.; Wang, F.; Hu, X.; Fu, A.; Yao, C. | 2022 | Latin American Journal of Pharmacy | Exclusion reason: Clinical Trials listing; |
|  | Efficacy of Repetitive Transcranial Magnetic Stimulation for Improvement of Memory in Older Adults With TBI | Nct, | 2018 | Efficacy of Repetitive Transcranial Magnetic Stimulation for Improvement of Memory in Older Adults With TBI | Exclusion reason: Clinical Trials listing; |
|  | Efficiency of Deep Transcranial Magnetic Stimulation on Patients With Mild Cognitive Impairment | Nct, | 2011 | Feasibility Study in Order to Test the Efficiency of Deep TMS on Patient With MCI | Exclusion reason: Clinical Trials listing; |
|  | Emotional memory retrieval. rTMS stimulation on left DLPFC increases the positive memories | Balconi, Michela; Ferrari, Chiara | 2012 | Brain imaging and behavior | Exclusion reason: TMS as Diagnostic; |
|  | Enhancement of episodic memory in young and healthy adults: a paired-pulse TMS study on encoding and retrieval performance | Gagnon, Genevieve; Schneider, Cyril; Grondin, Simon; Blanchet, Sophie | 2011 | Neuroscience letters | Exclusion reason: TMS as Diagnostic; |
|  | Enhancement of higher brain function of humans by transcranial magnetic stimulation and investigation of the mechanism of enhancement | Jprn, Umin | 2018 | http://www.who.int/trialsearch/Trial2.aspx?TrialID=JPRN-UMIN000031597 | Exclusion reason: Clinical Trials listing; |
|  | Enhancing Frontal Lobes Plasticity in Mild Cognitive Impairment | Nct, | 2020 | Enhancing Frontal Lobes Plasticity and Function in Patients With Mild Cognitive Impairment | Exclusion reason: Clinical Trials listing; |
|  | Enhancing Working Memory in Patients With Early Alzheimer's Disease Through the Use of rTMS | Nct, | 2015 | Enhancing Working Memory in Patients With Early Alzheimer's Disease Through the Enhancement of Dorsolateral Prefrontal Cortex Neuroplasticity: a TMS-EEG Study | Exclusion reason: Clinical Trials listing; |
|  | Exploratory research of rTMS in Alzheimer's disease | jRCTs, Jprn | 2019 | https://trialsearch.who.int/Trial2.aspx?TrialID=JPRN jRCTs052180226 | Exclusion reason: Clinical Trials listing; |
|  | Extent of dorsolateral prefrontal cortex plasticity and its association with working memory in patients with Alzheimer disease | Tanum, Lars; Solli, Kristin Klemmetsby; Latif, Zill-e-Huma; et.al | 2017 | JAMA Psychiatry | Exclusion reason: TMS as Diagnostic; |
|  | Facilitating Associative Memory Via Deep Transcranial Magnetic Stimulation to the Medial Temporal Lobe | Nct, | 2012 | Facilitating Associative Memory Via Deep Transcranial Magnetic Stimulation to the Medial Temporal Lobe | Exclusion reason: Clinical Trials listing; |
|  | Frequency-specific noninvasive modulation of memory retrieval and its relationship with hippocampal network connectivity | Hermiller, Molly S.; VanHaerents, Stephen; Raij, Tommi; Voss, Joel L. | 2019 | Hippocampus | Exclusion reason: Wrong population; |
|  | Functional asymmetries in human working memory | Fried, Peter Jacob | 2015 | Dissertation Abstracts International: Section B: The Sciences and Engineering | Exclusion reason: TMS as Diagnostic; |
|  | High frequency repetitive transcranial magnetic stimulation for cognitive impairment in early-phase psychosis: a pilot study | Francis M, Hummer T. Visco A. Yung M. Mehdiyoun N. Kulig T. Vohs J. Liffick E. Breier A. | 2017 | Biological Psychiatry | Exclusion reason: Abstract without outcomes data; |
|  | High frequency repetitive transcranial magnetic stimulation of dorsomedial prefrontal cortex for negative symptoms in patients with schizophrenia: A double-blind, randomized controlled trial | Gan, Hong; Zhu, Junjuan; Zhuo, Kaiming; et al. | 2021 | Psychiatry research | Exclusion reason: Wrong population; |
|  | High Frequency rTMS Treatment for Cognitive Impairments in Chronic Schizophrenia Patients | Nct, | 2018 | A Randomized, Double-blind Sham-controlled Trial of High Frequency rTMS for Cognitive Impairments in Chronic Schizophrenia Patients | Exclusion reason: Clinical Trials listing; |
|  | Higher motor cortical excitability linked to greater cognitive dysfunction in Alzheimer's disease: results from two independent cohorts | Zadey, Siddhesh; Buss, Stephanie S.; McDonald, Katherine; Press, Daniel Z.; Pascual-Leone, Alvaro; Fried, Peter J. | 2021 | Neurobiol Aging | Exclusion reason: TMS as Diagnostic; |
|  | High-Frequency Repetitive Transcranial Magnetic Stimulation Could Improve Impaired Working Memory Induced by Sleep Deprivation | Guo, Zhiwei; Jiang, Zhijun; Jiang, Binghu; McClure, Morgan A.; Mu, Qiwen | 2019 | Neural plasticity | Exclusion reason: Wrong population; |
|  | Impaired LTP- but not LTD-like cortical plasticity in Alzheimer's disease patients | Koch, Giacomo; Di Lorenzo, Francesco; Bonni, Sonia; Ponzo, Viviana; Caltagirone, Carlo; Martorana, Alessandro | 2012 | Journal of Alzheimer's disease : JAD | Exclusion reason: TMS as Diagnostic; |
|  | Impaired motor learning in older adults-concepts of underlying mechanisms and strategies for supporting impaired functions | Timmermann Je, Zimerman M. Wessel M. J. Gerloff C. Krakauer J. W. Hummel F. C. | 2015 | Clinical Neurophysiology | Exclusion reason: Abstract without outcomes data; |
|  | Impairment of motor cortex plasticity in Parkinson's disease, as revealed by theta-burst-transcranial magnetic stimulation and transcranial random noise stimulation | Stephani, Caspar; Nitsche, Michael A.; Sommer, Martin; Paulus, Walter; Gamboa, Huang Kuo Lefaucheur Terney | 2011 | Parkinsonism & Related Disorders | Exclusion reason: Wrong outcomes; |
|  | Influence of Repetitive Transcranial Magnetic Stimulation (rTMS) Challenge on Cognitive and Functional Magnetic Resonance Imaging Markers in Healthy Subjects | Nct, | 2011 | Influence of Repetitive Transcranial Magnetic Stimulation (rTMS) Challenge on Cognitive and Functional Magnetic Resonance Imaging Markers in Healthy Subjects | Exclusion reason: Clinical Trials listing; |
|  | Intermittent theta burst stimulation (iTBS) combined with working memory training to improve cognitive function in schizophrenia: study protocol for a randomized controlled trial | Song Jq, Liu D. Zhang M. Wang H. Q. Tan S. P. | 2020 | Trials | Exclusion reason: Protocol only; |
|  | Introducing a Novel Approach for Evaluation and Monitoring of Brain Health Across Life Span Using Direct Non-invasive Brain Network Electrophysiology | Zifman, Noa; Levy-Lamdan, Ofri; Suzin, Gil; Efrati, Shai; Tanne, David; Fogel, Hilla; Dolev, Iftach | 2019 | Frontiers in Aging Neuroscience | Exclusion reason: TMS as Diagnostic; |
|  | Investigating Neurophysiological Markers of Symptom Severity in Alzheimer's Disease | Hoy, Kate E.; Emonson, Melanie R. L.; Bailey, Neil W.; Humble, Gregory; Coyle, Hannah; Rogers, Caitlyn; Fitzgerald, Paul B. | 2022 | J Alzheimers Dis | Exclusion reason: TMS as Diagnostic; |
|  | Investigating the Effect of Repetitive Transcranial Magnetic Stimulation (rTMS) as a Treatment for Alzheimer's Disease | Nct, | 2016 | Investigating the Effect of Repetitive Transcranial Magnetic Stimulation (rTMS) as a Treatment for Alzheimer's Disease | Exclusion reason: Clinical Trials listing; |
|  | Keeping order in the brain: The supramarginal gyrus and serial order in short-term memory | Guidali, Giacomo; Pisoni, Alberto; Bolognini, Nadia; Papagno, Costanza | 2019 | Cortex; a journal devoted to the study of the nervous system and behavior | Exclusion reason: Wrong population; |
|  | Laterality of anterior temporal lobe repetitive transcranial magnetic stimulation determines the degree of disruption in picture naming | Woollams, Anna M.; J Lindley, Lee; Pobric, Gorana; Hoffman, Paul | 2017 | Brain structure & function | Exclusion reason: Wrong population; |
|  | Left DLPFC rTMS stimulation reduced the anxiety bias effect or how to restore the positive memory processing in high-anxiety subjects | Balconi, Michela; Ferrari, Chiara | 2013 | Psychiatry research | Exclusion reason: Wrong outcomes; |
|  | LIWA for Treatment of Alzheimer Patients | Nct, | 2014 | Transcranial Magnetic Stimulation (TMS) and Lithium Water for Treatment of Alzheimer Patients | Exclusion reason: Clinical Trials listing; |
|  | Long-term effect of low-frequency repetitive transcranial magnetic stimulation over the unaffected posterior parietal cortex in patients with unilateral spatial neglect | Shindo, Keiichiro; Sugiyama, Ken; Huabao, Lu; Nishijima, Kazunori; Kondo, Takeo; Izumi, Shin-Ichi | 2006 | Journal of rehabilitation medicine | Exclusion reason: Lack of complete outcome data; |
|  | LTP-like cortical plasticity is associated with verbal memory impairment in Alzheimer's disease patients | Di Lorenzo, Francesco; Motta, Caterina; Bonni, Sonia; et.al | 2019 | Brain Stimulation | Exclusion reason: TMS as Diagnostic; |
|  | LTP-like plasticity is impaired in amyloid-positive amnestic MCI but independent of PET-amyloid burden | Buss, Stephanie S.; Press, Daniel Z.; McDonald, Katherine; et al. | 2020 | Neurobiology of Aging | Exclusion reason: TMS as Diagnostic; |
|  | Mild cognitive impairment: loss of linguistic task-induced changes in motor cortex excitability | Bracco, L.; Giovannelli, F.; Bessi, V.; et al. | 2009 | Neurology | Exclusion reason: TMS as Diagnostic; |
|  | Modulation of Cerebellar-Cortical Connections in Multiple System Atrophy Type C by Cerebellar Repetitive Transcranial Magnetic Stimulation | Yildiz, F. Gokcem; Saka, Esen; Elibol, Bulent; Temucin, Cagri Mesut | 2018 | Neuromodulation : journal of the International Neuromodulation Society | Exclusion reason: Wrong outcomes; |
|  | Motor cortex excitability in Alzheimer disease: one year follow-up study | Pennisi, Giovanni; Alagona, Giovanna; Ferri, Raffaele; et al. | 2002 | Neuroscience letters | Exclusion reason: Wrong outcomes; |
|  | Motor cortex excitability in Alzheimer's disease and in subcortical ischemic vascular dementia | Alagona, Giovanna; Ferri, Raffaele; Pennisi, Giovanni; et al. | 2004 | Neuroscience letters | Exclusion reason: TMS as Diagnostic; |
|  | Motor dysfunction in mild cognitive impairment as tested by kinematic analysis and transcranial magnetic stimulation | Colella, Donato; Guerra, Andrea; Paparella, Giulia; et al. | 2021 | Clinical neurophysiology : official journal of the International Federation of Clinical Neurophysiology | Exclusion reason: Wrong outcomes; |
|  | MRI Guided Hippocampal Stimulation With Transcranial Magnetic Stimulation | Nct, | 2019 | MRI Guided Hippocampal Stimulation With Transcranial Magnetic Stimulation | Exclusion reason: Clinical Trials listing; |
|  | Navigated Repetitive Transcranial Magnetic Stimulation for Parkinson's Disease With Depression or Cognitive Impairment | Nct, | 2021 | Navigated Repetitive Transcranial Magnetic Stimulation for Parkinson's Disease With Depression or Cognitive Impairment | Exclusion reason: Clinical Trials listing; |
|  | Navigated TMS combined with EEG in mild cognitive impairment and Alzheimer's disease: a pilot study | Julkunen, Petro; Jauhiainen, Anne M.; Westeren-Punnonen, Susanna; et al. | 2008 | Journal of neuroscience methods | Exclusion reason: Wrong outcomes; |
|  | Network Modulation in Alzheimer's Disease | Nct, | 2019 | Neuromodulation of Language and Memory Networks in Alzheimer's Disease | Exclusion reason: Clinical Trials listing; |
|  | Network-based rTMS in Alzheimer's Disease | Nct, | 2020 | Novel Tailored Network-based rTMS Treatments in Alzheimer's Disease: an Integrated Multiimaging Approach | Exclusion reason: Clinical Trials listing; |
|  | Network-targeted stimulation engages neurobehavioral hallmarks of age-related memory decline |  | 2019 | Network-targeted stimulation engages neurobehavioral hallmarks of age-related memory decline | Exclusion reason: Lack of complete outcome data; |
|  | Network-targeted Theta-burst Stimulation for Episodic Memory Improvement in Mild Cognitive Impairment | Nct, | 2020 | Network-targeted Theta-burst Stimulation for Episodic Memory Improvement in Mild Cognitive Impairment | Exclusion reason: Clinical Trials listing; |
|  | Neural mechanism of repetitive transcranial magnetic stimulation on improving post-soke cognitive impairment based on multimodal magnetic resonance imaging | ChiCtr, | 2018 | http://www.who.int/trialsearch/Trial2.aspx?TrialID=ChiCTR1800015133 | Exclusion reason: Clinical Trials listing; |
|  | Neuro-navigated repetitive Transcranial Magnetic Stimulation (rTMS) for depression in dementia | Chi, Ctr Ior | 2016 | Clinical Efficacy of Neuro-navigated repetitive Transcranial Magnetic Stimulation (rTMS) in the management of Depression in Major Neurocognitive Disorders- a single blind randomized control trial | Exclusion reason: Clinical Trials listing; |
|  | Neurophysiological Correlates of Positive and Negative Symptoms in Frontotemporal Dementia | Benussi, Alberto; Dell'Era, Valentina; Cantoni, Valentina; et al. | 2020 | Journal of Alzheimer's disease : JAD | Exclusion reason: Wrong outcomes; |
|  | Neuroplasticity deficits in the dorsolateral prefrontal cortex of individuals with alzheimer's disease: A TMS-EEG study | Kumar S, Zomorrodi R. Blumberger D. M. et al. | 2015 | Biological Psychiatry | Exclusion reason: Abstract without outcomes data; |
|  | Neuropsychological and Neurophysiological Effects of Cognitive Stimulation in Patients With Alzheimer's Disease and Mild Cognitive Impairment | Nct, | 2018 | A Randomized, Placebo-Controlled, Parallel-Group Study to Evaluate the Efficacy of a Non-Pharmacological Intervention of Cognitive Stimulation in Subjects With Alzheimer's Disease and Mild Cognitive Impairment: the Brain Stimulation Project | Exclusion reason: Clinical Trials listing; |
|  | NeuroQore rTMS (Monophasic vs. Biphasic) for Major Depressive Disorder: a Randomized Controlled Pilot Trial | Nct, | 2016 | NeuroQore Repetitive Transcranial Magnetic Monophasic vs. Biphasic Stimulation For Major Depressive Disorder: a Randomized Controlled Trial | Exclusion reason: Clinical Trials listing; |
|  | New insights into Alzheimer's disease progression: a combined TMS and structural MRI study | Niskanen, Eini; Kononen, Mervi; Maatta, Sara; et al. | 2011 | PLoS ONE | Exclusion reason: TMS as Diagnostic; |
|  | No difference in paired associative stimulation induced cortical neuroplasticity between patients with mild cognitive impairment and elderly controls | Lahr, Jacob; Peter, Jessica; Minkova, Lora; et al. | 2016 | Clinical neurophysiology : official journal of the International Federation of Clinical Neurophysiology | Exclusion reason: TMS as Diagnostic; |
|  | Noninvasive brain stimulation improves cognitive function in Alzheimer's Disease: a pilot clinical study | Chi, Ctr Inr | 2016 | Effect of noninvasive brain stimulation for improving cognitive function in Alzheimer's Disease | Exclusion reason: Clinical Trials listing; |
|  | Noninvasive Dual-mode Stimulation Therapy for Neurorehabilitation in Mild Cognitive Impairment | Nct, | 2018 | Investigation for Individualized Noninvasive Neuromodulation in Mild Cognitive Impairment | Exclusion reason: Clinical Trials listing; |
|  | Noninvasive Dual-mode Stimulation Therapy for Neurorehabilitation in Post-stroke Cognitive Impairment | Nct, | 2018 | Investigation for Individualized Noninvasive Neuromodulation in Neurorehabilitation of Brain Disease: longitudinal Study | Exclusion reason: Clinical Trials listing; |
|  | Non-Pharmacological Treatments and Cognitive Impairment (NPT-CI2019) | Nct, | 2019 | New Approaches for the Treatment of Early Stages of Cognitive Impairment in Neurodegenerative Diseases | Exclusion reason: Clinical Trials listing; |
|  | Novel, Individualized Brain Stimulation, Network-based Approaches to Improve Cognition | Nct | 2021 | https://clinicaltrials.gov/show/NCT04986787 | Exclusion reason: Clinical Trials listing; |
|  | Online feedback enhances early consolidation of motor sequence learning and reverses recall deficit from transcranial stimulation of motor cortex | Wilkinson, Leonora; Steel, Adam; Mooshagian, Eric; et al. | 2015 | Cortex; a journal devoted to the study of the nervous system and behavior | Exclusion reason: Wrong outcomes; |
|  | Overlap of large-scale brain networks may explain the similar cognitive improvement of single-site vs multi-site rTMS in Alzheimer's disease | Alcala-Lozano, Ruth; Garza-Villarreal, Eduardo A.; Aviv, De Deng Fox Jarbo Lee Lee Nardone Schonfeldt-lecuona Stieglitz | 2018 | Brain Stimulation | Exclusion reason: Abstract without outcomes data; |
|  | Paired-pulse transcranial magnetic stimulation over the dorsolateral prefrontal cortex interferes with episodic encoding and retrieval for both verbal and non-verbal materials | Gagnon, Genevieve; Blanchet, Sophie; Grondin, Simon; Schneider, Cyril | 2010 | Brain Research | Exclusion reason: Wrong population; |
|  | Parkinsonism is associated with altered primary motor cortex plasticity in frontotemporal dementia-primary progressive aphasia variant | Di Stasio, Flavio; Suppa, Antonio; Fabbrini, Andrea; et al. | 2018 | Neurobiology of Aging | Exclusion reason: Wrong outcomes; |
|  | Personalized Repetitive Transcranial Magnetic Stimulation (rTMS) in Cognitive Fluctuations of Dementia With Lewy Bodies (DLB): proof of Concept | Nct | 2021 | https://clinicaltrials.gov/show/NCT05138588 | Exclusion reason: Clinical Trials listing; |
|  | Potential treatment targets for modulation of affective reactivity in mild cognitive impairment | Weisenbach, Sara L.; Kim, Joseph; Gallagher-Thompson, Goodkind Langenecker Ren Rose Thickbroom Wagner Zotev | 2017 | The American Journal of Geriatric Psychiatry | Exclusion reason: TMS as Diagnostic; |
|  | Prefrontal theta-Burst Stimulation Disrupts the Organizing Influence of Active Short-Term Retrieval on Episodic Memory | Marin, Bianca M.; VanHaerents, Stephen A.; Voss, Joel L.; Bridge, Donna J. | 2018 | eNeuro | Exclusion reason: Wrong population; |
|  | Probing the causal involvement of dlPFC in directed forgetting using rTMS-A replication study | Stauch, Benjamin J.; Braun, Verena; Hanslmayr, Simon | 2020 | PLoS ONE | Exclusion reason: TMS as Diagnostic; |
|  | Reconfiguration of Functional Dynamics in Cortico-Thalamo-Cerebellar Circuit in Schizophrenia Following High-Frequency Repeated Transcranial Magnetic Stimulation | Huang, Huan; Zhang, Bei; Mi, Li; et al. | 2022 | Frontiers in Human Neuroscience | Exclusion reason: Wrong outcomes; |
|  | Reduced interhemispheric inhibition in mild cognitive impairment | Tsutsumi, Ryosuke; Hanajima, Ritsuko; Hamada, Masashi; et al. | 2012 | Experimental brain research | Exclusion reason: Wrong outcomes; |
|  | Remediation of sleep-deprication-induced working memory impairment with fMRI-guided transcranial magnetic stimulation | Luber, B.; Stanford, A. D.; Bulow, P.; et al. | 2008 | Cerebral Cortex | Exclusion reason: Wrong population; |
|  | Repeated Transcranial Magnetic Stimulation for Improving Cognition in Alzheimer Disease: Protocol for an Interim Analysis of a Randomized Controlled Trial | Moussavi, Zahra; Koski, Lisa; Fitzgerald, Paul B.; et al. | 2021 | JMIR Res Protoc | Exclusion reason: Protocol only; |
|  | Repeated Transcranial Magnetic Stimulation for Improving Cognition in Patients With Alzheimer Disease: protocol for a Randomized, Double-Blind, Placebo-Controlled Trial | Moussavi, Z.; Rutherford, G.; Lithgow, B.; et al. | 2021 | Journal of medical Internet research | Exclusion reason: Protocol only; |
|  | Repeated Transcranial Magnetic Stimulation for Improving Cognition in Patients With Alzheimer Disease: Protocol for a Randomized, Double-Blind, Placebo-Controlled Trial | Moussavi, Zahra; Rutherford, Grant; Lithgow, Brian; et al. | 2021 | JMIR research protocols | Exclusion reason: Protocol only; |
|  | Repetitive TMS of the Default Mode Network in AD | Nct, | 2018 | Repetitive TMS of the Precuneus: a Randomized Double-blinded Placebo-controlled Trial in Alzheimer's Disease Patients | Exclusion reason: Clinical Trials listing; |
|  | Repetitive TMS of the default mode network: a randomized, double-blinded, cross-over study trial in MCI patients | Bonni S, Picazio S. Di Lorenzo F. Ponzo V. Pellicciari et al. | 2016 | Journal of Alzheimer's Disease | Exclusion reason: Abstract without outcomes data; |
|  | Repetitive TMS of the default mode network: a randomized, double-blinded, cross-over study trial in MCI patients | Di Lorenzo F, Bonni S. Picazio S. Ponzo V. Pellicciari, et al. | 2017 | Brain Stimulation | Exclusion reason: Abstract without outcomes data; |
|  | Repetitive Transcranial Magnetic Stimulation (rTMS) applied with H-coil in Alzheimer's disease: a placebo-controlled, double-blind, pilot study | Coppi E, Ferrari L. Nuara A. Chieffo R. Houdayer E.  et al. | 2016 | Clinical Neurophysiology | Exclusion reason: Protocol only; |
|  | Repetitive transcranial magnetic stimulation (rTMS) combined with cognitive training (rTMS-COG) is effective for the treatment of Alzheimer's disease | Rabey Jm, Dubronevsky E. | 2017 | Neurodegenerative diseases. Conference: 13th international conference on alzheimer's and parkinson's diseases, AD/PD | Exclusion reason: Abstract without outcomes data; |
|  | Repetitive Transcranial Magnetic Stimulation as Therapy for Apathy in Amyotrophic Lateral Sclerosis | Nct, | 2019 | A Pilot Study of Repetitive Transcranial Magnetic Stimulation for Improvement of Apathy in Amyotrophic Lateral Sclerosis | Exclusion reason: Clinical Trials listing; |
|  | Repetitive transcranial magnetic stimulation combined with cognitive training in Alzheimer's disease | Lee J, Oh E. Sohn E. H. Lee A. Y. | 2016 | Alzheimer's & dementia | Exclusion reason: Abstract without outcomes data; |
|  | Repetitive transcranial magnetic stimulation enhanced attention and psychomotor speed in patients with early alzheimer's disease | Anderkova L, Eliasova I. Marecek R. Rektorova I. | 2015 | Neurodegenerative diseases | Exclusion reason: Abstract without outcomes data; |
|  | Repetitive Transcranial Magnetic Stimulation for Alzheimer's Disease Based on Apolipoprotein E Genotyping: Protocol for a Randomized Controlled Study | Wei, Naili; Chen, Jian | 2021 | Front Aging Neurosci | Exclusion reason: Protocol only; |
|  | Repetitive transcranial magnetic stimulation for Alzheimer's disease: randomized double-blind controlled trials | ChiCtr | 2021 | https://trialsearch.who.int/Trial2.aspx?TrialID=ChiCTR2100041625. | Exclusion reason: Clinical Trials listing; |
|  | Repetitive Transcranial Magnetic Stimulation for Apathy in Alzheimer's Dementia | Nct, | 2014 | Repetitive Transcranial Magnetic Stimulation for Apathy in Alzheimer's Dementia | Exclusion reason: Clinical Trials listing; |
|  | Repetitive transcranial magnetic stimulation for apathy in mild cognitive impairment | Padala Pr, Padala K. P. Caceda R. Bopp M. Dennis R. A. Mennemeier M. S. Sullivan D. H. | 2016 | American Journal of Geriatric Psychiatry | Exclusion reason: Abstract without outcomes data; |
|  | Repetitive Transcranial Magnetic Stimulation for Dementia | Nct, | 2015 | Repetitive Transcranial Magnetic Stimulation for Dementia | Exclusion reason: Clinical Trials listing; |
|  | Repetitive Transcranial Magnetic Stimulation in Patients With Alzheimer Disease | Nct, | 2017 | Cognitive, Behavioral and Functional Effects of Repetitive Transcranial Magnetic Stimulation (rTMS) in Patients With Potential Alzheimer Disease: two Treatment Modalities Comparison | Exclusion reason: Clinical Trials listing; |
|  | Repetitive transcranial magnetic stimulation modulates cortical-subcortical connectivity in sensorimotor network | Chen, Jing; Fan, Yanzi; Wei, Wei; et al. | 2022 | European Journal of Neuroscience | Exclusion reason: Wrong outcomes; |
|  | Repetitive transcranial magnetic stimulation on cognition in mild cognitive impairment and early stage of Alzheimer's disease | Chi, Ctr Ipr | 2016 | http://www.who.int/trialsearch/Trial2.aspx?TrialID=ChiCTR-IPR-16009063 | Exclusion reason: Clinical Trials listing; |
|  | Research on modulating mechanism of repetitive transcranial magnetic stimulation in subjective cognitive decline: a randomized controlled trial | ChiCtr | 2020 | https://trialsearch.who.int/Trial2.aspx?TrialID=ChiCTR2000034533. | Exclusion reason: Clinical Trials listing; |
|  | RTMS as a treatment for Alzheimer's disease | Rutherford Ga, Moussavi Z. | 2014 | Alzheimer's & dementia | Exclusion reason: Abstract without outcomes data; |
|  | rTMS for the Treatment of Primary Progressive Aphasia: a Randomized Controlled Trial | Nct, | 2018 | Repetitive Transcranial Magnetic Stimulation for the Treatment of Primary Progressive Aphasia: a Randomized Controlled Tria | Exclusion reason: Clinical Trials listing; |
|  | rTMS to Improve Cognition in Parkinson's | Nct, | 2019 | rTMS as a Cognitive Rehabilitation Approach in Veterans With Parkinson's Disease | Exclusion reason: Clinical Trials listing; |
|  | rTMS Treatment of Primary Progressive Aphasia | Nct, | 2020 | Repetitive Transcranial Magnetic Stimulation in the Treatment of Primary Progressive Aphasia: a Randomized Controlled Trial | Exclusion reason: Clinical Trials listing; |
|  | Safety, tolerability, and feasibility of deep transcranial magnetic stimulation for late-life depression with comorbid major or mild neurocognitive disorder | Hodzic-Santor, Benazir H.; Meltzer, Jed A.; Verhoeff, Nicolaas Paul L.; Blumberger, Daniel M.; Mah, Linda | 2021 | International Psychogeriatrics | Exclusion reason: Lack of complete outcome data; |
|  | Short latency afferent inhibition differs among the subtypes of mild cognitive impairment | Nardone, Raffaele; Bergmann, Jurgen; Christova, Monica; et al. | 2012 | Journal of neural transmission (Vienna, Austria : 1996) | Exclusion reason: TMS as Diagnostic; |
|  | Short latency afferent inhibition: a biomarker for mild cognitive impairment in Parkinson's disease? | Yarnall, Alison J.; Rochester, Lynn; Baker, Mark R.; et al. | 2013 | Movement disorders : official journal of the Movement Disorder Society | Exclusion reason: TMS as Diagnostic; |
|  | Stability of rTMS on Cognition and Brain Networks on Healthy Subjects | Nct, | 2013 | Effect of Repetitive Transcranial Magnetic Stimulation (rTMS) on Cognition and Brain Networks in Healthy Subjects in 2 Sessions 15 Days Apart | Exclusion reason: Clinical Trials listing; |
|  | Study of Repetitive Transcranial Magnetic Stimulation in the Treatment of Cognitive Impairment in Schizophrenia | Nct, | 2013 | Study of Repetitive Transcranial Magnetic Stimulation in the Treatment of Cognitive Impairment in Schizophrenia | Exclusion reason: Clinical Trials listing; |
|  | Study on the Effect of Transcranial Magnetic Stimulation in Mild to Moderate Alzheimer's Disease | Nct, | 2020 | Prospective, Randomized, Evaluator-blind, Single Center Study on the Effect of Transcranial Magnetic Stimulation in Mild to Moderate Alzheimer's Disease | Exclusion reason: Clinical Trials listing; |
|  | Subcortical Intermittent Theta-Burst Stimulation (iTBS) Increases Theta-Power in Dorsolateral Prefrontal Cortex (DLPFC) | Bentley, J. Nicole; Irwin, Zachary T.; Black, Sarah D.;  et al. | 2020 | Frontiers in neuroscience | Exclusion reason: TMS as diagnostic; |
|  | Successful physiological aging and episodic memory: a brain stimulation study | Manenti, Rosa; Cotelli, Maria; Miniussi, Carlo | 2011 | Behavioural brain research | Exclusion reason: Wrong outcomes; |
|  | Targeted Transcranial Magnetic Stimulation to Improve Hippocampal-dependent Declarative Memory Abilities | Nct, | 2018 | Targeted Transcranial Magnetic Stimulation to Improve Hippocampal-dependent Declarative Memory Abilities | Exclusion reason: Clinical Trials listing; |
|  | Targeting Default Mode Network Dysfunction in Persons at Risk of Alzheimer's Disease with Transcranial Magnetic Stimulation (NEST4AD): Rationale and Study Design | Pievani, Michela; Mega, Anna; Quattrini, Giulia; et al. | 2021 | J Alzheimers Dis | Exclusion reason: Protocol only; |
|  | Temporal dynamics of memory trace formation in the human prefrontal cortex | Rossi, Simone; Innocenti, Iglis; Polizzotto, Nicola R.; et al. | 2011 | Cerebral cortex (New York, N.Y. : 1991) | Exclusion reason: Wrong population; |
|  | Test of Trans-cranial Magnetic Stimulation (TMS) Intervention on Unilateral Neglect | Nct, | 2010 | A Randomised Double-blind Test of TMS Intervention on Unilateral Neglect | Exclusion reason: Clinical Trials listing; |
|  | The contribution of the dorsolateral prefrontal cortex in full and divided encoding: a paired-pulse transcranial magnetic stimulation study | Blanchet, Sophie; Gagnon, Genevieve; Schneider, Cyril | 2010 | Behavioural Neurology | Exclusion reason: TMS as Diagnostic; |
|  | The dorsolateral prefrontal cortex plays a role in self-initiated elaborative cognitive processing during episodic memory encoding: rTMS evidence | Hawco, Colin; Berlim, Marcelo T.; Lepage, Martin | 2013 | PLoS ONE | Exclusion reason: TMS as Diagnostic; |
|  | The effect of nonfluent aphasia after ischemic cerebral infarction complicated with cognitive impairment: a comparative study of repetitive transcranial magnetic stimulation and diffusion tensor tractography | Chi, Ctr Inr | 2017 | http://www.who.int/trialsearch/Trial2.aspx?TrialID=ChiCTR-INR-17013288 | Exclusion reason: Clinical Trials listing; |
|  | The Effect of Repetitive Transcranial Magnetic Stimulation (rTMS) on Cognition in Patients With Traumatic Brain Injury: A Protocol for a Randomized Controlled Trial | Zhang, Han; Zhao, Yu; Qu, Yun; Huang, Yunyun; Chen, Zhu; Lan, Hong; Peng, Yi; Ren, Hongying | 2022 | Frontiers in neurology [electronic resource] | Exclusion reason: Protocol only; |
|  | The Effect of Repetitive Transcranial Magnetic Stimulation on Cognitive Impairment in Parkinson's Disease (PD) | Nct, | 2019 | The Effect of High Frequency Repetitive Transcranial Magnetic Stimulation on Cognitive Impairment in Parkinson's Disease | Exclusion reason: Clinical Trials listing; |
|  | The Effects of Intermittent Theta Burst Stimulation in MCI and Early AD | Nct, | 2020 | Cognitive Effects of Theta Burst Stimulation in Mild Cognitive Impairment and Alzheimer's Disease | Exclusion reason: Clinical Trials listing; |
|  | The effects of repetitive transcranial magnetic stimulation in older adults with mild cognitive impairment: a protocol for a randomized, controlled three-arm trial | Taylor, Joy L.; Hambro, Benjamin C.; Strossman, Nicole D.; et al. | 2019 | BMC neurology | Exclusion reason: Protocol only; |
|  | The effects of repetitive transcranial magnetic stimulation in patients with alzheimer's disease | Nct | 2021 | https://clinicaltrials.gov/show/NCT05102045 | Exclusion reason: Clinical Trials listing; |
|  | The Former Exploring Research: safety and Effect of ILF-TMS in the Treatment of Behavioral and Psychological Symptoms of Alzheimer's Disease | Chi, Ctr Inr | 2017 | http://www.who.int/trialsearch/Trial2.aspx?TrialID=ChiCTR-INR-17010487 | Exclusion reason: Clinical Trials listing; |
|  | The impact of transcranial magnetic stimulation on diagnostic confidence in patients with Alzheimer disease | Benussi, Alberto; Alberici, Antonella; Ferrari, Clarissa; et al. | 2018 | Alzheimer's research & therapy | Exclusion reason: TMS as Diagnostic; |
|  | The improvement of the episodic memory in the older adults and its cognitive neural mechanism | Chi, Ctr Ior | 2015 | http://www.chictr.org.cn/showproj.aspx?proj=11410 | Exclusion reason: Clinical Trials listing; |
|  | The inferior, anterior temporal lobes and semantic memory clarified: novel evidence from distortion-corrected fMRI | Visser, M.; Embleton, K. V.; Jefferies, E.; Parker, G. J.; Ralph, M. A. Lambon | 2010 | Neuropsychologia | Exclusion reason: Wrong outcomes; |
|  | the non-invasive brain stimulation therapy for Alzheimer's disease | Jprn, Umin | 2017 | http://www.who.int/trialsearch/Trial2.aspx?TrialID=JPRN-UMIN000027013 | Exclusion reason: Clinical Trials listing; |
|  | The posterior parietal cortex and subjectively perceived confidence during memory retrieval | Wynn, Syanah C.; Hendriks, Marc P. H.; Daselaar, Sander M.; Kessels, Roy P. C.; Schutter, Dennis J. L. G. | 2018 | Learning & memory (Cold Spring Harbor, N.Y.) | Exclusion reason: Wrong population; |
|  | The role of the prefrontal cortex in familiarity and recollection processes during verbal and non-verbal recognition memory: an rTMS study | Turriziani, Patrizia; Smirni, Daniela; Oliveri, Massimiliano; Semenza, Carlo; Cipolotti, Lisa | 2010 | NeuroImage | Exclusion reason: TMS as Diagnostic; |
|  | The study of diagnosis and treatment of senile dementia in Hebei Province | Chi, Ctr Rrc | 2011 | http://www.who.int/trialsearch/Trial2.aspx?TrialID=ChiCTR-RRC-11001345 | Exclusion reason: Clinical Trials listing; |
|  | Therapeutic effect of repetitive transcranial magnetic stimulation with cognitive training in mild to severe Alzheimer disease | Lee A, Lee J. Oh E. Shin J. Sohn E. | 2019 | Brain Stimulation | Exclusion reason: Abstract without outcomes data; |
|  | Theta Burst Stimulation Enhances Connectivity of the Dorsal Attention Network in Young Healthy Subjects: An Exploratory Study | Anderkova, Lubomira; Pizem, Dominik; Klobusiakova, Patricia; Gajdos, Martin; Koritakova, Eva; Rektorova, Irena | 2018 | Neural plasticity | Exclusion reason: Wrong population; |
|  | Theta burst stimulation induces changes in dorsal attentional network | Anderkova L, Gajdos M. Koritakova E. Rektorova I. | 2017 | Journal of the Neurological Sciences | Exclusion reason: Abstract without outcomes data; |
|  | TMS for staging and predicting functional decline in frontotemporal dementia | Benussi, Alberto; Dell'Era, Valentina; Cantoni, Valentina; et al. | 2020 | Brain Stimulation | Exclusion reason: TMS as Diagnostic; |
|  | TMS in Preclinical and Prodromal AD: modulation of Brain Networks and Memory | Nct, | 2020 | TMS in Preclinical and Prodromal AD: modulation of Brain Networks and Memory | Exclusion reason: Clinical Trials listing; |
|  | TMS Stimulation and Cognitive Training in Alzheimer Patients | Nct, | 2010 | Effects of a Combined TMS Stimulation and Cognitive Training in Alzheimer Patients: a Single-center, Randomized, Double-blind, Placebo-controlled Study | Exclusion reason: Clinical Trials listing; |
|  | TMS Treatment of Social Cognition Skills in Mild Cognitive Impairment | Nct, | 2020 | EFFECTS OF rtms TREATMENT ON SOCIAL COGNITION DYSFUNCTIONS IN MILD COGNITIVE IMPAIRMENT: AN PROSPECTIVE, DOUBLE-BINDING, RANDOMIZED, SINGLE CENTRE, EXPLORATIVE STUDY | Exclusion reason: Clinical Trials listing; |
|  | TMS-EEG Biomarkers of Amnestic Mild Cognitive Impairment Due to Alzheimer's Disease: A Proof-of-Concept Six Years Prospective Study | Ferreri, Florinda; Guerra, Andrea; Vollero, Luca; et al. | 2021 | Front Aging Neurosci | Exclusion reason: TMS as Diagnostic; |
|  | Transcranial Magnetic Stimulation (TMS) Treatment for Alzheimer Patients | Nct, | 2011 | Deep-TMS for the Treatment of Alzheimer Disease Patients | Exclusion reason: Clinical Trials listing; |
|  | Transcranial Magnetic Stimulation and Cognitive Stimulation in Mild Cognitive Impairment | Nct, | 2019 | Effect of Transcranial Magnetic Stimulation as an Enhancer of a Cognitive Stimulation Maneuver in Mild Cognitive Impairment | Exclusion reason: Clinical Trials listing; |
|  | Transcranial Magnetic Stimulation and Constraint Induced Language Therapy for Alzheimer Disease | Nct, | 2020 | A Phase II, Randomized, Blinded Study of Transcranial Magnetic Stimulation and Constraint Induced Language Therapy for the Treatment of Chronic Aphasia - Alzheimer Disease Sub-study | Exclusion reason: Clinical Trials listing; |
|  | Transcranial magnetic stimulation does not improve mild cognitive impairment in Parkinson's disease | Buard, Isabelle; Sciacca, David M.; Martin, Christine S.; et al. | 2018 | Movement disorders : official journal of the Movement Disorder Society | Exclusion reason: Abstract without outcomes data; |
|  | Transcranial Magnetic Stimulation for Alzheimer's Disease Treatment | Nct, | 2017 | Intervention Based on Transcranial Magnetic Stimulation for Alzheimer's Disease Patients: randomized Clinical Trial | Exclusion reason: Clinical Trials listing; |
|  | Transcranial Magnetic Stimulation for Apathy in Mild Cognitive Impairment | Nct, | 2018 | Transcranial Magnetic Stimulation for Apathy in Mild Cognitive Impairment | Exclusion reason: Clinical Trials listing; |
|  | Transcranial Magnetic Stimulation for Apathy in Mild Cognitive Impairment: pilot Study | Nct, | 2014 | Transcranial Magnetic Stimulation for Apathy in Mild Cognitive Impairment: pilot Study | Exclusion reason: Clinical Trials listing; |
|  | Transcranial magnetic stimulation in Alzheimer disease: motor cortex excitability and cognitive severity | Alagona, G.; Bella, R.; Ferri, R.; Carnemolla, A.; Pappalardo, A.; Costanzo, E.; Pennisi, G. | 2001 | Neuroscience letters | Exclusion reason: TMS as Diagnostic; |
|  | Transcranial Magnetic Stimulation in Nonfluent/Agrammatic Variant Primary Progressive Aphasia | Nct, | 2017 | A Randomized, Double-blinded, Sham-controlled Cross-over Study of Theta-burst Transcranial Magnetic Stimulation in Nonfluent/Agrammatic Variant Primary Progressive Aphasia | Exclusion reason: Clinical Trials listing; |
|  | Transcranial magnetic stimulation in patients with early cortical dementia: A pilot study | Issac, Thomas Gregor; Chandra, S. R.; Nagaraju, B. C. | 2013 | Annals of Indian Academy of Neurology | Exclusion reason: TMS as Diagnostic; |
|  | Transcranial magnetic stimulation intervention in Alzheimer's disease: a research proposal for a randomized controlled trial |  | 2018 | Transcranial magnetic stimulation intervention in Alzheimer's disease: a research proposal for a randomized controlled trial | Exclusion reason: Protocol only; |
|  | Transcranial magnetic stimulation of deep brain regions in Alzheimer's disease | Ash E, Bregman N. Moore O. Korczyn A. Zangen A. | 2014 | Alzheimer's & dementia | Exclusion reason: Abstract without outcomes data; |
|  | Transcranial magnetic stimulation of deep brain regions in Alzheimer's disease: A pilot study | Ash El, Vakhapova V. Bova I. Simon E. Korem M. Eldad M.; et al., | 2012 | Annals of Neurology | Exclusion reason: Abstract without outcomes data; |
|  | Transcranial magnetic stimulation predicts cognitive decline in patients with Alzheimer's disease | Motta, Caterina; Di Lorenzo, Francesco; Ponzo, Viviana; et al. | 2018 | Journal of neurology, neurosurgery, and psychiatry | Exclusion reason: TMS as Diagnostic; |
|  | Transcranial magnetic stimulation reveals diminished homoeostatic metaplasticity in cognitively impaired adults | Sundman, Mark H.; Lim, Koeun; Ton That, Viet; et al. | 2020 | Brain communications | Exclusion reason: Wrong outcomes; |
|  | Transient functional suppression and facilitation of Japanese ideogram writing induced by repetitive transcranial magnetic stimulation of posterior inferior temporal cortex | Ueki, Yoshino; Oga, Tatsuhide; Nagamine, Takashi; et al. | 2006 | Journal of Neuroscience | Exclusion reason: Wrong population; |
|  | Transient medial prefrontal perturbation reduces false memory formation | Berkers, Ruud M. W. J.; van der Linden, Marieke; de Almeida, Rafael F.; et al. | 2017 | Cortex; a journal devoted to the study of the nervous system and behavior | Exclusion reason: TMS as Diagnostic; |
|  | Using fMRI-guided TMS to Increase Central Executive Function in Older Adults (MCI\_Sub) | Nct, | 2019 | Using fMRI-guided TMS to Increase Central Executive Function in Older Adults (MCI\_Sub) | Exclusion reason: Clinical Trials listing; |
|  | Using neurostimulation to understand the impact of pre-morbid individual differences on post-lesion outcomes | Woollams, Anna M.; Madrid, Gaston; Lambon Ralph, Matthew A. | 2017 | Proceedings of the National Academy of Sciences of the United States of America | Exclusion reason: TMS as Diagnostic; |
|  | Using TMS to Increase Executive Function in Older Adults | Nct, | 2016 | Using fMRI-guided TMS to Increase Central Executive Function in Older Adults | Exclusion reason: Clinical Trials listing; |
|  | Visuomotor integration in early Alzheimer's disease: A TMS study | Nardone, Raffaele; Langthaler, Patrick B.; Schwenker, Kerstin; et al. | 2022 | Journal of the Neurological Sciences | Exclusion reason: Wrong outcomes; |

**Supplemental Table 3:** Formulas to calculate SMD for Meta-analyses

The same formula used to calculate change from baseline SD was used to calculate the SD of the difference scores between treatment and control groups (*Sdiff*). We followed the recommendation of Rosenthal and assumed a conservative estimation of r= 0.7.15 Standardized mean difference [SMD or Cohen’s d(z)] was calculated using the below formula.

The standard error ( of Cohen’s d(z) was calculated using the below formula.

**Supplemental Table 4:** Other characteristics of the studies in systematic review (n=143)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Author** | **Inclusion Criteria** | **Exclusion Criteria** | **Mean Age**  **Yr (SD)** | **Funding** |
| **AD -RCT Studies (n= 37)** | | | | |
| Ahmed 2012 | * Probable AD (NINCDS-ADRDA criteria) | * CVA * Metabolic disturbance or major medical illness * Epilepsy * Metallic objects in body * Craniotomy | 65.9 (5.9)  68.3 (4.9)  68.6 (6.7) | None |
| Alcala-Lozano 2018 | * Age 60-85 years * >5 years of education * Dementia by DSM-5 * MMSE >15 * GDS-Reisberg level 2 - 4 * If on Memantine or AChE inhibitors, complete at least 6 months of Rx * Stable medical conditions * Stable medication regimen for at least 2 months * Have a caretaker who can stay with the patient at least 10 hours per week | * Severe agitation and uncooperativeness * Epilepsy * CVA and/or focal neurological symptoms * Severe psychiatric disorders (psychosis, bipolar, MDD, and eating disorders) | 73.30 (6.03) 71 (4.27) | Instituto Nacional de Psiquiatría “Ramon de la Fuente Muniz” No. SIC-16-001 |
| Budak, 2023 | * NINCDS-ADRDA & DSM-V criteria for AD * 60 years and older * CDR scores 1 or 2 * Using AChEIs and Memantine * Living independently | * Metallic implants * Not able to walk independently * Physical disabilities * History of alcohol/substance   Abuse   * Mental illnesses including schizophrenia, and delirium * Epileptic disease, seizures, brain tumors, or trauma. | 72 (5.01)  73.6 (8.62)  74.9 (8.11) | None |
| BremA-K 2020 | * Mild to moderate AD (DSM-V criteria and NIA-AA) * Medium certainty on PET and/or MRI exam * Age 55- 90 years * Written informed consent * MMSE 18-24 * Able to see and hear - Normal or corrected * Primary language English (Boston) or Italian (Rome) | * Unstable chronic medical conditions. * Major structural / vascular abnormalities * Agitation, psychiatric disorders, substance abuse * Other progressive neurological disorders (different from cognitive impairment) * Contraindication for rTMS | 69.25(6.80) 66.00(7.19) 67.50(10.27) 69.10(5.24) | * Grants from NIH * Harvard Catalyst - The Harvard Clinical and Translational Science Center * An investigator-initiated grant from Neuronix Ltd. * Young Academics Support - Stiefel-Zangger Foundation of the University of Zurich, Switzerland * Swiss National Foundation * Junior Research and Career Development Award - Harvard Medical School * Portugal Program - Fundação para a Ciência e Tecnologia |
| Cheng, J 2021 | * Veterans Age > 55 * Diagnosis of mild or major neurocognitive disorder & exclusion of other causes of dementia * If on AChE or memantine, stable dosage for at least 4 weeks * Able to provide informed consent and obtain motor threshold * Stable medical condition and living environment | * Hx rTMS or ECT therapy * Not able to withdraw seizure medications safely * Implanted device/metal in brain * Active substance abuse, suicidal intent or plan, or psychosis * Active or Hx of seizure * TBI <2 months * Participation in concurrent clinical trial * Active or Hx mass lesion, CVA, or active CNS disease that increases seizure risk * Unable to complete neuropsychological assessments | 71.3 (7.6) 70.2 (7.6) | * Sierra Pacific Mental Illness Research, Education, and Clinical Center at the VA Palo Alto Health Care System; * VA Rehabilitation Research and Development Service grant * VA Biomedical Laboratory Research and Development Service grant |
| Cotelli 2011 | * Probable moderate AD (diagnosis by NINCDS-ADRDA) | * Confounding neurological and psychiatric disorders * Hearing or vision impairment * Hx alcohol abuse, psychosis, seizure, or MDD | 71.2 (6.1)  74.4 (3.8) | * Project grant from the ‘Ministero della Sanita` and from Associazione Fatebenefratelli per la Ricerca (AFaR) |
| Hu 2022 | * Age 60-90 years * Probable AD by 2011 NIA-AA guidelines * AD-related neuropsychiatric symptoms * CDR score of 2 * MMSE score 10-20 * GDS score of 8 * HIS <4 * >5th grade education * Able to cooperate with experiment | * Neurological diseases or severe diseases of the heart, liver, lung, and kidney * Alcohol and drug abuse * Metal implants, such as cardiac stents and pacemakers. | 79.33 (6.24)  76.86  (6.07)  77.10 (6.88)  75.33 (5.73) | * National Key R&D Program of China (grant numbers 2018YFC1314500, 2018YFC1314504) |
| Jia 2021 | * Probable AD (DSM-5) * CDR score between 0.5 and 2 * Age 55-85 years, and right-handed | * Severe liver, kidney, heart, and lung diseases * Hx head trauma, neurological disorders, psychiatric disorders, and/or substance abuse * Focal brain lesions on T1 or T2 images * rTMS contraindications (medical implants or devices, metal in the body, or epilepsies) * Continue same medications during the 2-week rTMS sessions | 71.41 (8.85) 73.41 (7.73) | * National Key Research & Development Program of China * National Natural Science Foundation of China * Key Research & Development Program of Zhejiang Province * Science and Technology Program of Hangzhou Municipality |
| Jiang 2021 | * AD criteria (NINDS-ADRDA): memory impairments and one or more cognitive impairments that affected their life, work, and social skills * No previous Hx psychosis or antipsychotic drug use in the past week * MMSE score: 10-26 * BEHAVE-AD total > 8 * HAM-D score < 17 * Age 60-85 years (all genders), an education level of elementary school or above * Patient or a family member had signed informed consent | * Patients with impaired consciousness, Hx of epilepsy, or craniocerebral surgery * AD patients with other neurological diseases that affect cognitive function (Parkinson’s disease) * Severe organic diseases, cerebral hemorrhage, cerebral thrombosis, severe coronary heart disease, cardiac stents/ pacemaker, or metal foreign bodies in the skull * Persistent speech or other disorders that affect the assessment of cognitive function * Hx psychotropic drugs in the last week * Unreliable medical history. | 70.66 (5.44) 69.33 (4.66) | None |
| Koch 2017 | * AD patients - Cognitively intact before the occurrence of CI * Subjective memory impairment - corroborated by informed caregiver for at least 12 months earlier | * Major systemic and psychiatric disorders, other neurological conditions, and signs of concomitant cerebrovascular disease (MRI) | 70 (5.1) | * Grant of the Italian ministry of Health |
| Koch 2022 | * Probable mild to moderate AD – International Working Group recommendations * Age 50-85 years * CDR score 0.5-1 * MMSE 18-26 * CSF biomarkers of AD amyloid and Tau * One caregiver * AChEI use for 6 months | * Extrapyramidal signs, history of stroke, other neurodegenerative disorders, and psychotic disorders * Treated 6 months before the study with antipsychotics, antiparkinsonian, anticholinergics and antiepileptic drugs * History of seizure, metal in the head, or implanted cranial or thoracic devices * Any TMS contraindication | 75 (5.6)  72.3  (7.2) | * Brightfocus Foundation (A2019523S) and the Italian Ministry of Health (Ricerca Corrente 2018) |
| Kumar 2020 | * Probable AD (NINCDS-ADRDA criteria) * MMSE > 17 * Not taking AChEI / on a stable dose for at least 3 months | * Contraindication for TMS * Other psychiatric illnesses | 76.5(6.8) 76.4(6.0) | * Weston Brain Institute * Canada Research Chairs program * Canada Foundation for Innovation * Center for Addiction and Mental Health Fellowship Award * University of Toronto Scholars Award * Temerty Centre for Therapeutic Brain Intervention |
| Leblhuber 2022 | * ICD-10 criteria for AD | * Brain lesions, immunologic and CVA lesions * Metabolic, endocrine, and nutritional etiologies for cognitive decline | 78.6 (1.76) | None |
| Lee 2016 | * Probable AD (DSM-IV) * MMSE score 18-26 * CDR 1 or 2 * Presence of a caregiver/ family member who spent >72 hours/ week with the patient to provide daily information about them * Read and write Korean proficiently * Brain MRI to exclude any organic brain lesions effecting cognitive function | * Hx alcohol abuse * Hx psychoactive medications use within the past month * Unable of touching a computer screen/ or unable to cooperate because of vision or hearing difficulty * rTMS contraindications | 72.1 (7.6) 70.3 (4.8) | * Chungnam National University Hospital Research Fund |
| Lee 2020 | * Mild AD (DSM-IV) * MMSE score: 21-26 * ADAS-Cog score: 17-30 * CDR score of 1 * Read and write Korean * AChEI use for least 2 months without dose changes | * Hx of psychiatric or neurologic disorders affecting cognition, seizure, alcohol, or drug abuse * Medication use known to affect cognition or lower seizure threshold, for past several months * Severe vision or hearing impairment | 72.1 (7.1) 73.5 (8.1) | * Korean Society of Geriatric Neurology |
| Leocani 2021 | * MMSE score < 24 * Demonstrable deficits in memory and at least one other area of cognition * Presence of a reliable caregiver * Able to sign a written informed consent | * Other neurological or psychiatric disorders accounting for the cognitive deficits * rTMS contraindications * Therapeutic changes in the last 5 weeks * Participation in other clinical trials in the last 3 months | 69.6(7.9) 72.6(8.3) | * Italian Ministry of Health * Italian Ministry of Foreign Affairs |
| Li, X 2021 | * AD diagnosis: Two research psychiatrists (DSM-V) * Able to provide informed consent * Scale BEHAVE-AD score > 8 * MMSE score: 10-26 * Disease duration > 3 months * All patients used Donepezil | * Hx epileptic disorders, seizures, brain tumors, or trauma * Other mental illnesses (depression, schizophrenia, and delirium) * Physical diseases (infection, DM, HTN, and others) * Hx rTMS trials * Significant adverse effects, metallic implants (DBS electrode) | 65.97 (8.47) 64.58 (7.88) | * Zhejiang Medical and Health Science and Technology Program * Ningbo Natural Science Foundation * Ningbo Municipal Innovation Team of Life Science and Health * Research project of Collaborative Innovation Center for Health Care Application Technology and Standards * Guangdong grant ‘Key technologies for treatment of brain disorders’ * Medicine and Engineering Interdisciplinary Research Fund of Shanghai Jiao Tong University * NSFC Grants |
| Lithgow 2021 | * Age >55 years * MOCA score 7-25 * CDR score of 1-2 * CSDD score of < 18 (rule out moderate to severe depression) * Probable mild or moderate AD (confirmed by neurologist, geriatrician, psychiatrist, or study coinvestigators) * Stable or no AChE for 3 months prior and during study * 6 weeks minimum following AChE discontinuation | * Active or unstable psychiatric, neurological, or medical disorders * Dementia other than AD * Intellectual disability * Vision or hearing impairment * Use of benzodiazepines and zopiclone, or high dose antipsychotics (2 weeks prior or during the study) * Any investigational clinical trial within 2 weeks prior to study * Active substance abuse disorder * Hx epileptic seizures or epilepsy * rTMS contraindications * Hx rTMS treatment within 3 months * Plans to change medication for Alzheimer disease, mood disorders, or pain during study | 71.9 (8.6)  71.7 (5.7)  67.5 (10.2) | * MITACS * Puchniak Family * NeuralDx Pty Ltd. |
| Liu, C 2021 | * Right-handed, Age 50-85 years * Probable AD (NIA-AA) * CDR score of 0.5 - 1.0 * GDS < 8 * HIS <4 | * Other neurological diseases, structural brain abnormalities, or severe diseases of the heart, liver, lung, or kidney * Metallic implants, such as pacemakers, DBS treatment devices, or cardiac stents * Active Benzodiazepine use or Hx drug abuse * MDD or other severe mental illness | 67.28 (7.74) 72.08 (7.30)  66.43 (6.44) | * National Key R&D Program * National Natural Science Foundation of China * Sichuan Science and Technology Program |
| Lu 2022 | * Age 60-90 years * DSM‐5: Major NCD due to Alzheimer's disease (NCD‐AD) or major NCD due to vascular disease (NCD‐vascular) * CSDD (Cornell Scale for depression in Dementia) score 7 or more | * History of neuropsychiatric disorders and major neurological disorders, including stroke, transient ischemic attack, and traumatic brain injury * Contraindications to TMS or MRI. | 69.2 (7.1)  73.7 (7.2) | * Hong Kong Research Grant Council (RGC)—General Research Fund |
| Padala 2020 | * Age > 55 years * AD diagnosis * AES-C score 30 or higher * MMSE score 18 or higher * Cleared TASS * On stable dose of antidepressants for at least two months * Participation of a caregiver who spent several hours/ week with patient | * Medication use that increases seizure risk or ototoxicity * Hx bipolar disorder, seizure disorder, seizure disorder in first degree relatives, implanted device, stroke, aneurysm, cranial neurosurgery, alcohol-related problems or active MDD | 74.3 (5.7)  79.6 (7.7) | * SCVAHCN Network Research Grant Program by Department of Veterans Affairs * Neuronetics Inc. Investigator Initiated Trial award (supplies only) |
| Qin 2022 | * Age > 50 years (Right-handed) * 6 years of education at least * Probable AD (NINCDS-ADRDA) * CDR memory score of 0.5-2 * HIS < 4 * Stable anti-dementia medication (donepezil or memantine) for at least 3 months | * Significant neurological or psychiatric diseases that might result in cognitive dysfunction * Unstable systemic condition * MRI/rTMS contra-indications (metal implants or claustrophobia) | 66.9 (7.4) 66.3 (8.1) | * National Natural Science Foundation of China * National Key Research and Development Project |
| Rabey 2013 | * Probable mild-to-moderate AD (DSM-IV) * MMSE score of 18-24 * CDR rating score of 1 * No serious metabolic or cardiac diseases | * Hx unstable medical conditions, lack of cooperation, severe agitation, epilepsy, alcohol/ drug abuse, or consistent use of benzodiazepines or other hypnotics within 2 weeks of study initiation (Tranquilizers use occasionally permitted) * Severe visual disturbances * AChEI and or memantine therapy (if < 2 months use) | 72.6 (8.9) 75.4 (9.07) | Funding None  Thank Neuronix Ltd., Yokneam, Israel |
| Rutherford 2015 | * Probable AD (neuropsychiatrist or neurologist) * Initial MOCA score: 5-26 * No Hx seizures * No metal in body * Age 40-90 years * Stable dose of any AD medications (at least 3 months prior and no plan to change during study) * English speaking * Able to arrange their own transportation to the treatment site with caregivers | * Any other type of dementia or neurological condition * Any major injury or surgery to the head * Moderate-to-severe depression | 57-87 (age range) | * National Science and Engineering Research Council (NSERC) of Canada |
| Sabbagh 2019 | * Mild to moderate AD (DSM-IV criteria) * Age 60-90 years * MMSE score 18-26 * ADAS-Cog > 17 * A reliable informant caregiver * No hearing or vision deficits * English or Hebrew fluency * >8th grade education * If medicated for AD, stable doses for >90 days of AChEI or memantine | * CDR 0.5 or 3 * Prominent agitation * Benzodiazepines or barbiturates use upto 2weeks * Pharmacological immunosuppression * Participation in an investigational clinical trial within 6 months * Hx seizures or epilepsy * rTMS or MRI contraindication * Depression, bipolar disorder, or psychotic disorders, or any other neurological or psychiatric condition * Alcoholism, drug addiction, or severe sleep deprivation * unstable medical, neurological, or psychiatric disorder (other than AD) | 76.9 76.7 | * Sponsored by Neuronix Ltd., Yoqneam, Israel |
| Saitoh 2022 | * MMSE score of ≤ 25 * CDR score of 1 or 2 * AD medication use or a history of use for > 6 months without having achieved control of cognitive function | * Severe dementia (MMSE < 10) * Severe mental illness, suicidal thoughts, history of seizures * Pregnancy, receiving rTMS within 1 year * Enrollment in other clinical trials within 6 months * TMS contraindication | 76.2  77.2  75.8 | None |
| Tao 2022 | * AD – DSM IV criteria & NINCDS-ADRDA | * Serious physical illness (liver, kidney, or severe cardiovascular illness) * History of neurological diseases (such as epileptic disorders, seizures, brain tumors or trauma), or mental illnesses (such as depression, schizophrenia or delirium) * MMSE score 0–10 * TMS contraindications (cardiac pacemakers or metallic bodily implants) | 67.8 (5.4)  68.9  (4.9) | * Project of Army Medical University: Military Medical pre Research Fund |
| Turriziani 2019 | * AD patients | NR | 72.4 (5.2) 71.28 (3.5) | * Funding from the department of Health’s National Institute for Health Biomedical Research Centre funding scheme * AIRAlzh Onlus-COOP Italia. |
| Vecchio 2021 | * Fluent Italian-speaking skills as first language * Brain MRI excluding any focal brain lesion that might have affected cognitive function * Stable use of AChEI and/or memantine therapy (taken for at least 3 months with a stable dosage for 60 days) | * CDR score of 0 or 3 * Severe agitation, lack of cooperation, Unstable medical conditions * Alcoholism and/or drug abuse, Hx Epilepsy * Other neurological or psychiatric disorders different from AD * Regular use of benzodiazepines or other hypnotics (until 2 weeks before the study) * rTMS or MRI contraindications (cardiac pacemaker or electrodes, intracranial implants, cochlear implants, metal clips, infusion medication pumps) | 71.07 (1.25)  72.24 (2.29) 75.2 (2.29) | * Italian Ministry of Health for Institutional Research * NEUROMASTER: NEUROnavigated MAgnetic STimulation in patients with mild-moderate Alzheimer disease combined with Effective cognitive Rehabilitation and by Toto Holding * Merck Sharp & Dohme - sponsorship |
| Wei 2022 | * AD- DSM V * CDR: 0.5 – 2 * Age 55- 88 years * Right handed | * Severe liver, kidney, heart, and [lung diseases](https://www.sciencedirect.com/topics/medicine-and-dentistry/silo-fillers-disease) * History of significant [head trauma](https://www.sciencedirect.com/topics/medicine-and-dentistry/closed-head-injury), neurological, and psychiatric disorders * T1 or T2 brain images show presence of focal [brain lesions](https://www.sciencedirect.com/topics/neuroscience/brain-lesion) * MRI contraindications | 70 (8.63)  71.67 (7.16) | * Natural Science Foundation of China * National Key Research & Development Program of China * Key Research & Development Program of Zhejiang Province * Science and Technology Program of Hangzhou Municipality |
| Wu 2015 | * Probable AD (NINCDS-ADRAD) * Age 60-80 years * Minimum 5 years of education * MMSE < 24 * BEHAVE-AD > 8 * No Hx epilepsy, stroke, or major head trauma * No severe physical illness or implants which could limit the use of rTMS * No antipsychotic use or other drugs affecting mental activity in the previous month | NR | 71.4 (4.9) 71.9 (4.8) | * Supported by the Wuxi Science and Technology Development Project |
| Wu 2022 | * Probable AD (NINCDS-ADRDA) * MMSE 10-27 * CDR score < 2 * Stable dose of donepezil for at least three months * Age 50 years or older | * Clinical features or work-up suggestive other than AD * Hx significant head trauma or neurological disorders * Focal brain lesions (T1/T2 images) * Hx seizures or Hx in 1st-degree relatives * An implanted pacemaker, vagal stimulator, or deep brain stimulator * Hx rTMS treatment | 66.46 (8.25)  66.35 (7.99) | * Natural Science Foundation of China * National Key R&D Program of China * 2021 Youth Foundation training program of the First Affiliated Hospital of Anhui Medical University |
| Yao  2022 | * Age 60 - 80 years * No vision or hearing deficits * Greater than 8th-grade education * A reliable informant caregiver * MMSE score >16 * Stable doses of AChEI or memantine for >90 days, for those on medications | * History of seizures or epilepsy * Barbiturates or benzodiazepines use up to two weeks before enrollment * Bipolar disorder, depression, psychotic disorders, or any other neurological or psychiatric condition | 63.87 (6.85)  67.60 (7.88) | * Nanjing Health Bureau Medical Science and Technology Development Key Project * Nanjing Medical University Fund |
| Zhang 2019 | * Probable AD – 30 patients * 03/2016 – 05/2018 (Department of Neurology in Tongji Hospital Wuhan, China) - NINCDS-ADRDA criteria | * Hx CVA, metabolic disturbance, other major medical illnesses, or epilepsy * Moderate to severe depression (HDSS > 17) * Cerebral small vascular disease * Metallic objects (cochlea, brain, pacemakers) or Hx craniotomy * Visual and hearing impairments limiting training * Refusal to participate | 69 (8.19) 68.54 (7.93) | * National Natural Science Foundation of China |
| Zhang, S  2022 | * A reliable informant caregiver * No visual or hearing deficits * 8th grade education at least * Stable doses of AChEI or memantine for more than 1 month. | * Prominent agitation * Use of benzodiazepines or barbiturates up to 2weeks before screening * History of seizures or diagnosis of epilepsy * Contraindication for MRI or rTMS * Alcoholism, drug addiction, or severe sleep deprivation * Psychiatric disorders other than AD * Severe medical disorders, such as cardiovascular and cerebrovascular diseases or pulmonary infection | 84.8 (5.6)  83.4 (4.1) | National Natural Science Foundation of China |
| Zhao 2017 | * AD (DSM IV) – 30 patients: 17 TMS/ 13 sham * MMSE score 18-26 * Global CDR 1 or 2 * Accompanied by a caregiver / family member who spent > 72 hours/ week with the patient to provide daily information * Read and write Chinese proficiently * Brain MRI excluding any organic brain lesions that might affect cognitive function * On stable medications, 2 months prior and during study | * Hx alcohol abuse or psychoactive medication use in the past month * Not able to touch a computer screen, or cooperate with the technician because of vision or hearing difficulty * rTMS contraindications * Not available for TMS treatment | 69.3 (5.8)  71.4 (5.2) | None |
| Zhou 2022 | * Age 55-85 years, right-handed * Han ethnicity * AD diagnosis (NIA-AA criteria) * MMSE <23, MoCA <23, CDR =0.5 or 1, HIS <4, Pittsburgh Sleep Quality Index >8 | * CDR >1 * CVA, other nervous system diseases, or severe heart, liver, lung, kidney, or other systemic diseases * Moderate to severe depression or other mental diseases (GDS <11) * Cardiac pacemakers, coronary stents, dental/other metal implants, cochlear implants, or other ferromagnetic materials | 74 (63.25-79)  70 (64-76) | None |
| **AD – Open Label studies (n= 19)** | | | | |
| Avirame 2016 | * AD diagnosis * Rx AChE inhibitors for at least 6 months | * NR | 76.18 | Acknowledge Brainsway for technical support |
| Bentwich 2011 | * Age 55-85 years * Probable early or moderate AD (DSM-IV criteria) * MMSE 18-24, CDR = 1 * Hx occasional tranquilizer use were allowed * If on AChE inhibitors or memantine, more than 2 months of use * If mild depression, controlled by medication * Have a caregiver responsible for patient participation and stay with patient for at least 10 h/week. | * Hx epilepsy / severe agitation/ lack of cooperation * Unstable medical conditions * Alcoholism and/or drug abuse * Regular use of benzodiazepines or other hypnotics within 2 weeks before study | 75.4 (4.4) | Neuronix Ltd, Yokneam, Israel |
| Cotelli 2006 | * Probable AD (diagnosis by NINCDS-ADRDA) | * Confounding neurological and psychiatric disorders * Hearing or vision impairment * Hx alcohol abuse, psychosis, seizure, or MDD * No implanted metal objects | 76.6 (6.0) | Project grant from the Ministero della Sanita` and from Associazione Fatebenefratelli per la Ricerca (AFaR) |
| Cotelli 2008 | * Probable AD (diagnosis by NINCDS-ADRDA) * Mild CI classified as MMSE >17/30 & Moderate to severe CI is classified by MMSE <17/30. | * Confounding neurological and psychiatric disorders * Hearing or vision impairment * Hx alcohol abuse, psychosis, seizure, or MDD * No implanted metal objects | 77.6 (5.8)  75 (6.2) | Project grant from the Ministero della Sanita` and from Associazione Fatebenefratelli per la Ricerca (AFaR) |
| Devi 2014 | * Aphasia (by Category fluency (CFL) naming and BDAE) | * Newly diagnosed AD * Pacemaker or implanted metal object placement * Seizures or epilepsy and medication use that lowers seizure threshold * Hx migraines * Uncontrolled depression | 73.12 (7.9) | None |
| Gandelman-Marton 2017 | * Mild AD (DSM-IV) * MMSE score: between 18 – 24 * CDR score of 1 | * NR | 75.5 (4.3) | Neuronix Ltd, Yokneam, Israel - Fund for Medical Research, Assaf Harofeh Medical Center, Israel |
| Golaszewski 2021 | * Probable AD (NINCDS-ADRDA criteria) | * Metallic prosthesis or fragments in the cranial and thoracic districts, tinnitus, * Hx retinal detachment and brain hemorrhage | 72.8 (6.2) 74.2 (8.4) | None |
| Guo 2021 | * Probable AD (NINCDS-ADRDA), and DSM-V criteria * No medication change (during study and for 2 months prior) * Age 50-75 years, right-handedness | * Severe CI (MOCA <10) * Severe depression (HAM-D score >20) * Hx psychiatric or neurological disorders (schizophrenia, Parkinson’s disease, and multiple sclerosis) * Hx Brain injury or cranial neurosurgery * Hx alcohol or drug abuse * Any severe chronic systemic illness (Heart failure and renal failure) * rTMS contraindication (metallic implanted device, aneurysms) | Mild 65.8 (8.4)  Moderate 70.2 (5.8)  Control: 63.7 (2.0) | * Supported by National Natural Science Foundation of China * Medical Science and Technology Research Foundation of Guangdong Province * Shenzhen Basic Research Program * National Health and Medical Research Council of Australia |
| Hanoglu 2022 | **AD criteria:**   * Clinical Dementia Scale Stage 1 or 2 * No neurological or psychiatric disease other than AD * No medication or dose change during treatment   **PD criteria:**   * PD diagnosis * No other neurological or psychiatric disease other than Parkinsonism * No medication or dose change during treatment * Absence of serious * mental or psychological disorder   **Healthy participants:**   * No neurological or psychiatric disease * No medication * MMSE score of 24 or higher | **AD & PD Criteria:**   * TMS safety concerns, the presence of metal, implantable devices such as pacemakers, and the use of anti-epileptic drugs | 70.67 (7.71)  70.63 (4.63)  69.15  (5.60) | None |
| Kayasandik 2022 | * AD: NINCDS-ADRDA criteria. * CDR scores 1-2 * Use AChEI and/or memantine | * Metallic implants * Unable to walk independently, being physically disabled * History of alcohol or substance abuse, mental illness including schizophrenia and delirium, and epileptic disease, seizure, brain tumor, or trauma | 69.86 (8.23) | Istanbul Medipol University support for researchers |
| Mano 2022 | * AD diagnosis for more than one year * MMSE score < 25 * Use of AChEI and memantine, with no satisfactory effect * Age 20-85 years | * Severe cognitive dysfunction (MMSE score <13) * Severe aphasia, agnosia, and apraxia * Serious mental disorder * Suicidal tendencies * Hx epilepsy * Implantable heart stimulation and pacemakers * Deep brain stimulation device, metal device in the head (except the titanium product) * Pregnancy * Unanswered questionnaires * Any intervention in other clinical trials within six months | 73.8 (10.6) | * Strategic Research Program for Brain Sciences from MEXT and AMED of Japan, Grant-in-Aid for Scientific Research (KAKENHI) * Magnetic Health Science Foundation and Health Labor Sciences Research Grant. |
| Nguyen 2017 | * Probable AD (MRI findings compatible) | * NR | 73 (7.2) | None |
| Rabey 2016 | * NR | * NR | NR | Neuronix Ltd, Yokneam, Israel |
| SuarezMoreno  2022 | * NR | * NR | 73 | None |
| TetiMayer 2021 | * Age >50 years (Right-handed) * 1st ever stroke with unilateral hemispheric lesions (CT or MRI) criteria of the revised 4th National Cerebrovascular Disease conference * Disease course: 14 days to 2 months with stable vital signs * 8 years of education  Able to complete cognitive tests and clinical examinations * MMSE score <26 * Passed rTMS safety screening | * Severe organ dysfunction (heart, lung, liver, and kidney) * Severe mental, psychological, visual, auditory, or speech (aphasia) disorder * Hx thyroid disease  Coma, lethargy, unconsciousness, dementia, or CI before CVA (interview and review of medical history) * Severe infection * Hx epilepsy * Long-term use of corticosteroids or amiodarone | 61.79 (5.51) 59.47 (6.75) | University Hospital of Besançon–Internal Call for Clinical Trials |
| Traikapi  2022 | * AD – NIA-AA criteria, by neurologist * MMSE 17-24 * GDS 4-5 * IADL 10-20 * Basic ADL >/= 5 * Stable medical and pharmacological condition for 2 months | * Excessive alcohol use or psychoactive drug use in last 2 months * History or Family history of Epilepsy * GDS>15 * Severe hearing or visual loss, medical implants in the head, pacemaker, history of brain injury, cardiac surgery, CVA * On anticholinergic medications * No caregiver | 70.75 (5.06) | * None |
| Velioglu 2021 | * Eligible for MRI and TMS procedures | * NR | 69.86 (8.23) | * Istanbul Medipol University Research Fund |
| Wu 2020 | * Probable AD (NINCDS-ADRDA)  MMSE 10-27 * CDR score < 2 * Stable dose of donepezil for at least three months * Age 50 years or older | * CDR > 2 * Hx significant head trauma or neurological disorders (MDD) * Focal brain lesions on T1 or T2 images (MRI) * Hx seizure or seizure Hx in first-degree relatives or other neurologic disease * Implanted pacemaker, medication pump, vagal stimulator, or deep brain stimulator | 71.15 (7.95) | * National Key R&D Program of China * The Province Natural Science Foundation Project of Anhui |
| Xiao 2022 | * Age 50-85 years * AD diagnosis: NINCDS-ADRDA * CDR: 0.5-2 * MMSE 10-27 * Steady donepezil dose for 3 months before and through the study | * Hx drug abuse, alcoholism, or mental illness * Severe heart, lung, liver, and kidney dysfunction * Acute and chronic infection * Craniocerebral trauma or severe cerebrovascular disease | 64.5 (9)  63.98 (7.62) | * Natural Science Foundation of China * National key Research and Development program of China * 2021 Youth Foundation Training Program of the First Affiliated Hospital of Anhui Medical University |
| **AD+MCI studies (n= 6)** | | | | |
| Bagattini 2020 | * MMSE > 16 * CDR score 0.5 – 2 * Age 60-85 years * Diagnosis by neurologists or geriatricians   If on AChE inhibitors, be on a stable dose for at least 3 months | * Any confounding medical, neurological, or psychiatric conditions   Any contraindication for TMS | 73.56 (4.91) 73.35 (1.09) | * Fondazione Europea Ricerca Biomedica (FERB Onlus).   Italian Ministry of Health grants |
| Eliasova 2014 | Early AD and aMCI | NR | 75 (7.52) | * “CEITEC — Central European Institute of Technology” from the European Regional Development Fund |
| DiLorenzo 2020 | 3 groups criteria:   * 1. MCI patients (negative CSF biomarker and absence of dementia)   2. Prodromal AD (PROAD) patients (positive CSF biomarkers and absence of dementia)   3. AD Dementia(ADD) patients (positive CSF biomarkers and presence of dementia). * Subjects with hippocampal type memory impairment (RAVLT)   ADD patients were under treatment with acetylcholinesterase inhibitors | * Treatment with antipsychotics, antiparkinsonian, anticholinergics and antiepileptic drugs within six months | 36.8 (5.7) 70.2 (6.2)  66 (6.4)  66.2 (5.1) | * Grants of the Alzheimer’s Drug Discovery Foundation * The Brighfocus Foundation   The Italian Ministry of Health |
| Lv 2023 | * NIA-AA, 2011 – AD * SCD – Jessen, 2014 criteria: Self-reported decline in memory, with normal MMSE, MoCA, CDR, & AVLT   aMCI – Petersen 2004: Subjective memory complaint by informant, MoCA or AVLT scores below 1.5 SD for age & education, MMSE >24, CDR = 0.5, No dementia per DSM-IV or NIA-AA criteria | * Brain tumors, epilepsy, Parkinson's disease, severe anxiety and depression, thyroid dysfunction or other neurological or psychiatric disorders that can cause memory loss   MRI contraindication excluded | 67.67 (5.47)  66.44 (8.27) | * National Natural Science Foundation of China * Clinical Trials from the Affiliated Drum Tower Hospital, Medical School of Nanjing University |
| Tumasian 2021 | Possible/ Probable AD or aMCI (NINCDS-ADRDA) | NR | 74 (7) | * Acknowledge permission to access National Alzheimer’s Coordinating Center database (funded by NIA/ NIH). |
| Yang 2022 | * AD – NINCDS-ADRDA criteria   **aMCI criteria:**   * Memory complaint by the subject and/or an informant * AVLT-DR scores below or equal to 1.5 SD of education and age-adjusted norms * CDR = 0.5 * MMSE ≥24 | * Brain tumors, epilepsy * Parkinson’s disease * Severe anxiety and depression * Thyroid dysfunction, or other neurological or psychiatric disorders * MRI contraindication | 67.38 (7.67)  67.83  (7.41) | * National Natural Science Foundation of China * Jiangsu Provincial Key Medical Talents * Key Research and Development Program of Jiangsu Province of China * National Key Research and Development Program of China * Jiangsu Province Key Medical Discipline |
| **MCI - RCT Studies (n= 12)** | | | | |
| Chen 2021 | * Memory complaint corroborated by an informant or the subject for > 3 months * Objective memory impairment adjusted for age and educational level * MMSE > 24; CDR = 0.5 * No or minimal impairment in ADL * Age 50-80 years   Absence of dementia (per NINCDS-ADRDA) | * Hx CVA (modified HISS > 4) * Alcoholism, head injury, brain tumors, Parkinson’s disease, epilepsy, encephalitis, major depression, or other neurological or psychiatric illness * Any major medical illness * Severe visual or hearing loss * Inability to complete neuropsychological tests or Contraindication for MRI * MRI (T2-images) has major white matter changes, assessed by two radiologists   Any medication use | 67.5 (8.85)  69.5 (7.59) | * National Key Research and Development -program of China * National Natural Science Foundation of China * Medical Science and technology development Foundation - Nanjing Department of Health * Cooperative Research Project of Southeast University-Nanjing Medical University * Key Research and Development Plan Project of Jiangsu Province * Jiangsu Provincial Medical Talent project * Innovation and Entrepreneurship Training Program for College Students in Jiangsu Province * Key Scientific Research Projects of Colleges and Universities in Henan Province |
| Cui 2019 | * Age 50-85 years (both genders), right-handed. * 6 years of education * aMCI due to AD (NIA-AA 2011 criteria), with only cognitive impairment as reported by the patient, caregiver, or physician * CDR score of 0.5; HIS less than 4 * Absence of dementia (DSM-IV)   stable medication for at least 3 months | * Significant neurological or psychiatric diseases that might result in cognitive dysfunction * Unstable systemic condition   MRI/rTMS contraindications (ex: metal implants or claustrophobia) | 73.91 (10.01) 74 (7.62) | * National Natural Science Foundation of China, Shuguang Program - Shanghai Education Development Foundation   Shanghai Municipal Commission of Health and Family Planning, and the Shanghai Municipal Education Commission - Gaofeng Clinical Medicine Grant |
| DrumondMarra 2015 | * Age 60-74 years * Education > 4 years * Neuropsychological test performance below normal for age and education * MoCA < 24, CDR = 0, GDS-15 <5, HAMD-17 <7, HAMA-14 <8 * Able to attend TMS and neuropsychological assessments | * Psychiatric disorders (except remitted depression >12 months) and alcohol or drug abuse (according to Structured Clinical Interview for DSM IV - Patient Edition), neurological conditions and severe uncontrolled organic disease * Pacemaker   Hx seizures, major head trauma, neurosurgery, and cerebral metallic artifacts | 65.1 (3.5) 65.2 (4.1) | None |
| Esmaeili 2017 | * Age 20 - 70 years   MCI (MoCA score < 26) | * Cardiac pacemakers and psychiatric disorders   Secondary causes of cognitive decline (Hx brain injury accompanied with loss of consciousness, Hx benzodiazepines / alcohol / theophylline use, B12 deficiency, hypothyroidism, and brain lesions | 53.12 | Iran University of Medical Science |
| Esposito  2022 | * MCI – NIA-AA * CDR = 0.5 * Age ≥ 40 at the onset of cognitive symptoms * Ability to understand and to sign the informed consent. | * Medical illnesses or substance abuse, interfering with cognitive functioning * Any (other) major systemic, psychiatric, or neurological diseases or CVA * MRI or TMS contraindications | 67.85 (9.28)  66.77 (9.08) | None |
| Gy 2021 | * DSM-5 and NIA-AA guidelines   Decreased cognitive functioning compared to a previous level (neuropsychological tests) MOCA and MMSE were performed | Contraindication for rTMS | 67.2 (4.8) 66.1 (5.5) | CONACYT- scholarship |
| He 2021 | * Idiopathic PD (UK Brain Bank Society criteria) by a neurologist specialized in movement disorders * Receiving a stable medication dosage during study period * MCI (Movement Disorder Task Force Level II criteria for MCI in PD) * Comprehensive neuropsychological test (RBANS) | * A cardiac pacemaker, intracranial metal clips or deep brain stimulator   Hx seizure or serious medical conditions | 70.0 (6.3) 74.8 (6.9) | * Supported by the Taipei Veterans General Hospital Grant   MOST Grant |
| Padala 2018 | * Age > 55 years * MCI (Petersen's criteria) * AES-C score 30 or higher * MMSE score 23 or higher * Cleared TASS   On stable dose of antidepressants (if applicable) for at least two months prior to the enrollment | * Medication use that increases seizure risk or ototoxicity   Hx bipolar disorder, seizure disorder, seizure disorder in first degree relatives, implanted device, stroke, aneurysm, cranial neurosurgery, alcohol-related problems or active MDD | 68.0 (10.0) 64.0 (9.0) | * NIH grant * SCVAHCN Network Research Grant Program by Department of Veterans Affairs * MIRECC VISN 16 Pilot grant   Neuronetics Inc. Investigator Initiated Trial award (supplies only) |
| Pan 2020 | * Complying with VCIDN criteria * Graduated from primary school or above * Did not participate in similar experiments in past or near future * Age 18-80 years   Patient's and family's providing informed consent | * Cognitive impairment due to non-vascular diseases * Insufficiency in organs (heart, liver, and kidneys) * Epilepsy and mental illness * Clouded in the mind or with dizziness * Communication impairment   Medication use for CI | 63.41 (3.28) 63.87 (3.16) | * Project of Key Research and Development Program in Hebei Province * Langfang Science and Technology Support Program   Hebei Medical Science Research Project |
| Rektorova 2005 | * CVA without dementia (DSM IV criteria), mild executive deficits   CVA (brain imaging and clinical examination) | * Hx Epilepsy or an epileptic seizure * Symptoms of increased intracranial pressure * CVA or acute MI within 3 months of study * Hx alcohol or drug abuse   Hx psychotic symptoms and/or delirium | 72.9 (3.4) | None |
| Sedlackova 2008 | * MCI without dementia (MMSE > 24, and DSM-IV) * Mild executive deficits (neuropsychological examination)   CVA relevant to the diagnosis of MCI-V (brain imaging: Extensive periventricular and deep white matter lesions, or diffuse symmetrical areas of low attenuation with ill-defined margins extending to centrum semi oval, plus at least one lacunar infarct) | * Hx epilepsy or an epileptic seizure * Symptoms of increased intracranial pressure * Pacemaker * CVA or Acute MI (within 3 months prior to study) * Hx alcohol or drug abuse * Hx psychotic symptoms and/or delirium   A current depressive episode | 70.3 (8.7) | None |
| Yuan 2021 | * aMCI (Petersen criteria) * Age 55-75 years, right-handed * Memory complaint (patient or family) or Memory impairment relative to age  MOCA score > 26 * CDR 0.5 points * Total decline scale (Global Deterioration Scale): 2- 3   Normal daily living ability | * Diseases that cause cognitive decline (CVA, vascular disease, PD, traumatic head injury, other related medical history) * HIS > 4 * HDSS > 8 * Claustrophobia or visual / hearing/ speech impairment that limits ability to complete fMRI and cognitive tests   TMS contraindications (metal implants, electronic devices, or pacemakers) | 65.08 (4.89)  64.67 (4.77) | * National Natural Science Foundation of China * Science and Technology Planning Project of Shenzhen of China * Science and Technology Planning Project of Guangdong Province of China * Shenzhen Health and Family Planning System Research Project of China |
| **MCI Open label studies (n= 4 )** | | | | |
| Chen, Yu  2022 | * No known neurological and psychiatric conditions (e.g., previous seizure history, Parkinson’s disease, stroke, dementia, or depression). * MCI - Uniform Data Set version 3 (UDS3) scores | * No TMS or MRI contraindications * Auditory and visual acuity were normal or corrected to normal. * None taking antipsychotic medications nor experienced withdrawal from drugs | 70 (3) | * National Institutes of Health R01 and R21 grants |
| Trebbastoni 2016 | * Age 50-80 years * Self-reported Hx subjective memory decline (corroborated with informant), gradual onset and slow progression over a year; objective memory impairment (neuropsychological evaluation) * MMSE score > 24 * CDR score of 0.5 (with a memory box score > 0.5) * GDS short form score < 6 * Normal functional abilities (corroborated by Caregiver, ADL and IADL) * Normal B12, folate, and thyroid hormones * Low CVA risk with no signs or symptoms of severe HTN, DM, heart disease, or dyslipidemia * Modified HIS < 4 * MRI brain <6 months ago (no evidence of moderate or severe chronic ischemic CVA), rated visually on axial FLAIR images using the Fazekas scale (< grade 2) | * Medication use affecting CNS (antidepressants, antipsychotics, anticonvulsants, AChEI) or any other dietary supplement indicated in the symptomatic treatment of MCI | 74.9 (3.4)  71.3 (6.7) 73.4 (4.0) | * None |
| Turriziani 2012 | * Healthy subjects:   Right-handed, Native Italian speakers, No Hx neurological or psychiatric problems   * MCI: Diagnostic criteria for MCI | * None | 100 HS: 20-35  8 MCI: 66.4 (5.7) | * None |
| Zhang, X  2022 | * Age 55–75 years * Right-handed * American Academy of Neurology (AAN) diagnostic criteria for MCI * Harkinski ischemia score < 4 * MoCA score 26-18 | * History of severe organ dysfunction * History of psychiatric disorders such as major depression, generalized anxiety disorder, and schizophrenia * TMS contraindications such as metal implants * Any type of dementia * Use of medications that may affect the EEG within 1 month before enrollment. | 66.4 (6.09)  63.75 (2.46) | * Shenzhen Science and Technology Innovation Commission * Shenzhen Key Medical Discipline Construction Fund |
| **Non-AD RCT studies (n= 20)** | | | | |
| Barwood 2013 | Hx left MCA CVA, 2-6 years ago, with residual language impairments | * Any contraindication for TMS   Any speech or language therapy during participation in this study | 60.8  (5.98) 67  (13.11) | * The National Stroke Foundation, Australia   Graduate School Research Travel Grant - University of Queensland, Australia. |
| Chu  2022 | * Stroke: Guidelines for Diagnosis and Treatment of Cerebral Hemorrhage in China (2019) or the Guidelines for Diagnosis and Treatment of Acute Ischemic Stroke in China (2018) * Cerebral hemorrhage or cerebral ischemia accompanied by cognitive impairment: MMSE <26 * No visual or hearing impairment * No progression of neurological symptoms | * Metallic devices, pacemakers, or skull defects * Hx epilepsy or risk of seizures * Intracranial occupying lesion, including arteriovenous malformation or brain tumor (based on imaging results) * Cognitive dysfunction (such as Alzheimer’s disease) * Depression and other mental disorders. | 57.24 (14.03)  61.5 (14.18)  66.75 (12.23) | * Key Research and Development Program of Zhejiang Province * Scientific Research Program of Zhejiang Rehabilitation Medical Center |
| Cheng, TS 2021 | * PD diagnosis (Parkinson’s UK Brain Bank Society criteria) * A stable medication dosage for PD during the study * Cognitive impairment fulfilling the diagnostic criteria for PD and MCI (Movement Disorder Society Task Force Level II criteria) | * Dementia diagnosis or other degenerative brain diseases * Metallic intracranial devices, pacemakers, or other electronic devices * An unstable medical condition * Hx seizure   Concurrent use of antidepressants or neurostimulators | 71.4 (8.5) 71.6 (5.1) 73.9 (6.9) | Supported by MOST grant. |
| GroissSj 2012 | * Significant decrease (2SD) in fine motor skills (abnormal slowing to complete NHPT) * Able to consent * No TMS contraindication * No increased seizure risk (awake EEG)   Stable medication for >3 months | NR | 49.34 | A research fellowship - Ichiro Kanehara Foundation |
| Hill 2020 | * Pure or mixed right-handers * Initial screening by a movement disorders specialist using Part III (motor examination) of the MDS-UPDRS * Cognitive impairment (MOCA score<26) | * MOCA score <17 (Severe CI) * rTMS contraindications   Co-morbid neurological diagnoses | 71 | * Alfred Research Trusts Small Project Grant * Unrestricted educational grants from Ipsen, Allergan and Stada, and honoraria from UCB.   NHMRC Dementia Fellowship |
| Hu 2018 | * Diagnosis of stroke (Brain CT or MRI) with lesions in the left hemispheric Broca area * First and only strokes more than a month before initiation of the study with lesion singularity (CT or MRI) * Language function meets normal population standards before stroke * Diagnosis of non-fluent aphasia (WAB standard: aphasia quotient < 93.8, verbal fluency test 0-4) * Native Chinese speakers * Attained a minimum primary school level Education * No Hx epilepsy, severe heart disease, or other severe somatic diseases   Right-handed and able to consent for informed consent forms by the patients and their families | * Patients with non-inferior frontal lobe infarcts * CT or MRI established that the stroke for which they were hospitalized was not their 1st * Hx positive for language impairment, and their present stroke is accompanied by severe dysarthria * Language impairment due to other neuro degenerative disorders (dementia, Parkinson's disease, motor neuron disease) * Severe somatic disease, (epilepsy, severe hepatorenal disease) * Possess comorbid visual or auditory impairments that could influence language performance and evaluation of language function * A metal or electronic device implanted in the body | 46.5 ( 12.1) 47.3 ( 9.8) 48.5 ( 11.2) 50.7 ( 10.4) | National Natural Science Foundation of China |
| Huang  2023 | * PPA & variant diagnosis: Based on consensus by Gorno-Tempini 2011. | * Deficit pattern better explained by other nondegenerative nervous system or medical disorders * Cognitive deficits explained by other diseases through neuropsychological examination * Significant impairments of episodic memory, visual memory and visual perception * Significant behavioral deficits in early stages * Hx of loss of consciousness due * to secondary causes such as epilepsy or encephalitis * Disease duration < 6 months * rTMS/ MRI contraindications * Inability to complete assessments as significant language/ hearing impairment, severe depression or other psychiatric symptoms (HAMA> 14 and HRSD> 18) * MMSE score ≤ 18 * Pregnancy | 64.2 (7.6)  66.2 (5.5) | * Non-profit Central   Research Institute Fund of the Chinese Academy of Medical Sciences   * National High-Level Hospital Clinical Research   Funding |
| Khedr Em 2019 | * Age 50-75 years (both genders) * CI - MMSE Arabic version < 23 point for educated patients or < 21 for non-educated patients   Subjective complaint of either gradual or sudden cognitive change by the patient | * Other organic causes of dementia, depression, and other psychiatric comorbidities * Hx repeated head injury, repeated cerebrovascular strokes, or encephalitis * Oculogyric crises or supranuclear gaze palsy * Hx antipsychotics use or been exposed to MPTP (1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine) drug * Early severe dementia, severe dysautonomia, cerebellar signs, Babinski sign, strictly unilateral features after 3 years, sustained remission, hydrocephalus or intracranial lesion on neuroimaging, and no response to levodopa | 65.56 (8.73)  59.33 (10.27) | None |
| Ko 2014 | * Nonfluent aphasia due to a first-ever left MCA infarct with cortical involvement (MRI) * 3 months post-stroke and in a stable medical and cognitive condition   No Hx dementia/ CI (MMSE) or other confirmed neurodegenerative diseases | * Severe global aphasia or fluent aphasia, spatial neglect, visual field deficit, or emotional problems (Aphasic Depression Rating Scale) * TMS contraindication | 62.3 (12.1) 62.8 (14.5) | * Taiwan National Science Council Grant   Taipei Veterans General Hospital Grant |
| Li 2020 | * 1st hemorrhagic CVA with lesions in unilateral basal ganglia and/or corona radiate (CT or MRI) * Stable vital signs with no deterioration of neurological symptoms * <3 months from the accident * Age 50-75 years * Right-handed * Cognitive disability: MMSE < 24 (junior high school and above)/20 (primary school)/17 (illiteracy)   Without severe aphasia, visual or hearing impairment | * Non-first stroke * Prior Hx CI, epilepsy, or psychotic disorder * Cognitive dysfunction from other causes (alcohol or drug abuse) * Any serious medical comorbidity that could influence the study * Metal or electronic device implants (cardiac pacemaker, a cochlear implant, deep brain stimulator, aneurysm clip, ventriculoperitoneal shunt, or internal fixation devices) * Cranial vault defects   Non-compliance with study | 65.47 (3.68) 64.53 (4.72) | Foundation of Universal Application Projects of the Heath and Family Planning Commission of Sichuan Province |
| Li, H 2021 | * Age >50 years * 1st CVA with unilateral hemispheric lesions (CT or MRI) criteria of 4th National Cerebrovascular Disease conference, 1995 * Disease course: 14 days to 2 months with stable vital signs * Education >8 years * Right-handed * Complete cognitive tests and clinical examinations * MMSE score <26   Passed rTMS safety screening | * Severe organ dysfunction (heart, lung, liver, and kidney) or infection * Severe mental, psychological, visual, auditory, or speech disorder * Hx thyroid disease, epilepsy * Coma, lethargy, unconsciousness, dementia, or CI before CVA (Interview and review of medical Hx)   Long-term use of corticosteroids or amiodarone | 61.79 (5.51) 59.47 (6.75) | None |
| Margolis 2019 | NR | NR | 67 (7) | Internal grant from the Rhode Island Hospital Department of Neurology. |
| Medina 2012 | * Able to produce meaningful words and phrases (2-4 words in length during baseline language evaluation) * Must have relatively intact language comprehension (At or above the 25th percentile on the BDAE subtests for word comprehension and commands) * Able to name at least 3 items of the first 30 on the Boston Naming Test, and an average of at least 3 pictures out of 20 when presented with 10 sets of picture naming stimuli   At least 6 months post-stroke | * Hx neurological, or psychiatric disease, or unstable medical conditions   Contraindications to either MRI or TMS | 60.6 (7.1)  62.6 (10.1) | * NIH 2R01 DC05672-04A2 * NIH/NINDS 1K01NS060995-01A1 * Robert Wood Johnson Foundation/Harold Amos Medical Faculty Development Program   American Academy of Neurology Foundation |
| Pytel 2021 | * Diagnosis of PPA (confirmed with FDG-PET) * CDR score of 0-1   A native spanish speaker | * rTMS or MRI contraindication * Hx epilepsy * Other language disorders prior to PPA diagnosis   Neuroimaging not suggestive of PPA | 66.95 (7.24) 66.14 (7.31) | * Instituto de Salud Carlos III - the project INT20/00079   Research support technician by the Instituto de Salud Carlos III (PTA 17/13618) |
| Srovnalova 2012 | * Bilateral motor PD symptoms * Without dementia (MMSE score >26) | * A current depressive episode (ICD-10) | 66 (6.0) | * CEITEC-Central European Institute of Technology * Grant IGA from the Czech Ministry of Health |
| Trung 2019 | PD patients with MCI  (MCI defined by level 2 criteria of the movement disorder Society task Force) | NR | 71.3 (7.3) 67.3 (5.2) | * Advisory Boards and Honoraria from UCB Pharma, Novartis, AbbVie, Teva * Canadian Institute of Health Research, Canada Research Chair Program, National Parkinson Foundation, Parkinson's Disease Foundation, Parkinson Society Canada and Weston Brain Institute   Canadian Institutes of Health Research, Parkinson Society Canada, Natural Sciences and Engineering Research Council of Canada |
| TsaiP-Y 2020 | * Left hemispheric ischemic or hemorrhagic stroke > 3 months, with Hx CI (RBANS score < 85) * No seizure history * No intracranial occupying lesion, including arteriovenous malformation or brain tumor (imaging results)   No concurrent use of anti-depressants or neurostimulators | * Unstable cardiac dysrhythmia * Fever, infection, or Hyperglycemia * Epilepsy or Hx tranquilizer use * Neurostimulators or other medications that affect the cortical motor threshold   Metallic intracranial devices, pacemakers, or other electronic devices | 60.13 (14.1) 56.23 (12) 57.45 (12.3) | This work was supported by the Taipei Veterans General Hospital Grant (V104C058). |
| Wei 2021 | PD patients from the affiliated hospital of Southwest Medical University | Depression (BDI scores > 14)  CI (MOCA < 26) Psychotic symptoms and other neurological diseases | 61.73 (8.02) 64.67 (9.96) | * Grant from Health and Family Planning Commission of Sichuan Province   Research foundation grant from Southwest Medical University |
| Yin 2020 | * CVA (4th National Cerebrovascular Disease Academic Conference - brain CT or MRI) * 1st ever CVA (1-6 months old)  Right-handed, Age 30-75 * MoCA < 26 * No severe aphasia, able to complete cognitive tests * Stable vital signs, no progression of neurological symptoms * Normal cognitive function before stroke * Able to tolerate MRI * Voluntary participation   Sign the informed consent | * Non-first stroke * Complete left prefrontal cortex injury confirmed by CT/MRI * Transcranial surgery/ skull defect * Metal or pacemaker implants * Hx brain tumor, brain trauma, seizures, and risks of seizures * Cognitive function decline before CVA   Any neuropsychiatric comorbidity, affective disorder, or other factors that affect cognitive assessments and treatments | 55.69 (12.92) 58.17 (11.27) | * National Natural Science Foundation of China * Science and Technology Planning Key Project of Guangzhou * Guangdong Basic and Applied Basic Research Foundation   Natural Science Foundation of Guangdong Province of China |
| Yingli  2022 | * PSCI diagnosis: Expert consensus on the management of post-stroke cognitive impairment of 2017 * Hx of stroke that was confirmed by either brain CT or MRI examinations. * Cognitive impairment MMSE grade < 24 (junior high school and above)/20 (primary school)/17 (illiteracy) * Stroke within the past 6 months | * Cerebral diseases such as traumatic brain injury, intracranial tumors and infections, and hypoxic-ischemic encephalopathy * Mental illness, high alcohol consumption, and drug abuse * Severe complications that possibly result in patients with unstable conditions * Serious hearing or visual impairments * Presence of foreign metal | 60.39 (10.87)  59.50 (11.25) | * Key Science and Technology Planning Foundation of Xuzhou * Key Health and Health Committee Foundation of Jiangsu Province * Clinical Technical Backbone Foundation of Xuzhou |
| **Non-AD - Open label and Case Series (n= 6)** | | | | |
| Antczak 2018 | * Abnormal MOCA * Age 40-80 years * Have a caregiver who can assist with therapy adherence and assess changes in patient’s daily function. * Neuroimaging within 2 years | * Clinical symptoms not suggestive of FTD * Rx with memantine or AChE inhibitors | 61.7 (10.1) | * Minimal teaching stipend – Elmiko Medical * Reimbursement of travel costs / participation fee to attend Magstim TMS Summer School |
| Cha  2022 | * Age ≥ 20 years * Cognitive impairment developed with stroke despite adequate rehabilitation (atleast 3 months of intense rehab, 30 mts twice that includes tailored cognitive and perceptual training), and duration of PSCI ≥6 months. * MMSE score of 26 * PSCI: DSM-IV and Erkinjuntti imaging criteria * Depression developed after stroke, as determined by a Geriatric Depression Scale score ≥ of 10 or clinical symptoms | * Other causes of cognitive decline, such as Alzheimer’s dementia * Prior rTMS treatment within 6 months * Systemic infections * TMS contraindications | 53.8 (8.2) | * Korea Health Technology R&D Project through the Korea Health Industry Development Institute, funded by the Ministry of Health & Welfare, Republic of Korea |
| Cotelli 2012 | * Mild to moderate language impairment (Aachener Aphasie Test) * Monitor for at least 1 year after enrolment | * MRI findings of CVA, hydrocephalus and intracranial mass * Hx TBI or seizures or another neurological disease * Significant medical problems within 5 years * MDD, bipolar disorder, schizophrenia, substance use disorder or mental retardation (DSM-IV) * Implanted metal objects or any contraindication for rTMS | 69.1 (9.3)  68.2 (10.1) | * Grant from the Alzheimer’s Association |
| Eydi-Baygi  2022 | * MS: Neurologist diagnosis * Relapsing-remitting MS * Age 20 - 45 years and possessing at least a diploma. | * Pregnancy and epilepsy * Metal prosthetics, cranial shunting, and pacemaker * Refusing to cooperate with treatment sessions, or other psychological therapy during the study. | 33.6 | * Research Thesis |
| Shehata 2015 | * Patients or their caregivers were autonomous and consented for study participation | * Symmetrical onset * Epileptic seizures at onset * Sustained L-dopa response * Hx major tranquilizer intake or toxin exposure * Metabolic derangements and other secondary causes (brain MRI) | 61.3 (4.4) | * none |
| Neri 2021 | * Logopenic/phonological variant of Primary progressive Aphasia | * NA | 70.5 | * None |
| **Other Psychiatric Disorders - RCT studies (n= 20)** | | | | |
| BuchholtzPe 2020 | * Age 18- 80 years * HAM-D (total) 20 or higher; 6-item HAM-D subscale, 9 or higher * ICD-10 criteria for Moderate to severe depression & DSM-IV criteria for MDD.   Both unipolar and bipolar patients were included. | * Organic brain damage * Hx epilepsy * Metallic objects in body * Somatic diseases associated with brain dysfunction * Pregnancy, use of coercive measures   Severe suicidal risk, severe agitation or delirium, and alcohol or drug dependence (ICD-10) | 47 (20)  50 (18) | * Foundation of Psychiatric Research- the Foundation of Health science, Region Midtjylland,   Research Committee, Department of Affective Disorder, Aarhus University Hospital. |
| Cheng 2016 | * Recurrent MDD (DSM-IV, using MINI * Failure to 2 antidepressant treatments   CGI-S at least 4, HDRS -17 total score at least 18 | * Hx psychotic disorders, bipolar I or II, substance abuse or dependence, or personality disorder (DSM-IV) * Major medical illness or neurological disorders * Neurostimulators or cardiac pacemakers   Pregnancy | 21-70 (Age range) | * Grants from Taipei Veterans General Hospital   Ministry of Science and Technology and Military Medical Bureau |
| Du  2022 | * ICD-10 criteria for Schizophrenia according to two senior psychiatrists * Right-handed * Age 20–60 years and Han Chinese ancestry * ≥ 5-years’ duration of illness * Fixed antipsychotic medication for at least 12 mo before enrollment * Scale for the Assessment of Negative Symptoms (SANS) score ≥ 20 | * Physical diseases such as aneurysm, seizure, stroke, and cardiovascular disorders * Illegal drug or alcohol abuse/dependence | 45.9 (10)  45.1 (10.4) | None |
| Guan 2020 | * Male, right-handed, Han Chinese * PANSS positive score < 24 and negative symptom score > 20   >5-year duration of illness. | * Cerebral pathologies (multiple sclerosis seizure, dementia, epilepsy, aneurysm, Huntington’s disease, brain tumor, stroke, Parkinson’s disease, severe headache for unknown reasons) and cardiovascular diseases * ECT or rTMS within past 6 months * Hx of autoimmune diseases, HTN, DM, CVA, Family Hx epilepsy, pregnancy, or breastfeeding * Education level <5 years   Psychotherapy during rTMS or within 6 months | 55.5 (7.3) 49.3 (10.2) | Supported by the Scientific and Technological Program of Hebei |
| Guse 2013 | * Schizophrenia (ICD-10) with predominantly negative symptoms (>20 points on PANSS) * Illness duration of at least 6 months * Stable doses of second-generation antipsychotics, and had stable PANSS scores 2 weeks before inclusion   Healthy right-handed comparison subjects, pair-matched for age (maximal difference of 2 years), gender and educational level | * Hx neurologic illness (epileptic seizures)   Contraindications to MRI scanning (magnetic implants) | 36 (range 20-58)  36 (range 20-58) | * University Medical Center and the MR- research in Neurology and Psychiatry, George August-University Goettingen * Institute of cognitive Neuroscience, Ruhr-University Bochum * Department of Psychology, University of Edinburgh, UK   German Research Foundation |
| Hasan 2016 | * Schizophrenia (ICD-10 code - F20.xx) – MINI Plus interview) * Age 18-60 years * Illness duration at least 1 year * PANSS negative sub-score >20 points, one of items N-N7 scoring >4, and no reduction of >10% in PANSS negative sub-score, 2 weeks before intervention   Stable Antipsychotic medication for 2 weeks before study | * Psychiatric comorbidity (drugs or alcohol abuse) * Concomitant treatment with anticonvulsant drugs or benzodiazepines (lorazepam >=2 mg/day, diazepam>=10 mg/day) * Hx epileptic seizures or baseline EEG epileptic activity * Hx rTMS treatment, or rTMS contraindication * Verbal IQ<85   Unstable medical conditions, involuntary hospitalization, or pregnancy | 36.4 (10.6) 35.5 (9.0) | * Supported by the Deutsche Forschungsgemeinschaft Grant   German Federal Ministry of Education and Research grant |
| Hausmann 2004 | * Depressive episode of MDD or bipolar I disorder (DSM-IV)   Inpatients from a psychiatric ward at the University Hospital Innsbruck, Innsbruck, Austria | NR | 47.33 (13.34) 47.00 (11.31) 45.23 (11.95) | Supported by grant from Ministry of Culture, Education, and Research of the Grand-Duchy of Luxembourg, Europe |
| Holczer 2021 | * Unipolar MDD (DSM-IV Axis I disorders)   Stable pharmacological status for at least 2 weeks before the study and maintained throughout TBS therapy | * Comorbid major psychiatric disorders (as substance abuse, psychosis) * Hx neurological disorders (stroke, epilepsy, head injury)   TBS contraindications (metallic implants near head or any implanted electronic devices) | 51.86 (14.55) 48.68 (12.35) | * University of Szeged Open Access Fund * New National Excellence Programme * Grants GINOP-2.3.2-15- 2016-00034 and GINOP 2.3.2-15-2016-00048 * Hungarian Brain Research program * Bolyai Scholarship Programme of the Hungarian Academy of Sciences   EU-funded Hungarian grant |
| Hou  2022 | * ICD-10 depression criteria * HAMD-24 scores are all >20 * Age 60-80 * No history of antidepressants, rTMS, MECT, or other physical therapy in the last three months * No serious physical or other mental diseases * Early onset depression relapse or late onset depression in old age | * NR | 69.19 (3.8)  70.31 (4.13)  71.03 (3.99) | * None |
| Hoy 2019 | * MDD (DSM-IV & MINI) criteria following TBI * Ages 25-78 years * Current depressive episode of at least moderate severity (MADRS >20)   At least 6 weeks post-TBI and have no structural damage to either frontal lobe (MRI confirmed) | * Unstable medical condition, neurological disorder, Hx seizure disorder, or pregnancy or lactating * New antidepressant or psychotherapy in the 4 weeks prior to enrolment or during study   If on antidepressant medication, any dose changes 4 weeks prior to and during study | 46.29 (12.65) | * National Health and Medical Research Council & Practitioner fellowships * Victoria NeuroTrauma initiative (VNI)   Received equipment for research from Magventure A/S and Brainsway Ltd. |
| Jagawat  2022 | * Age 18-50 years * Minimum education up to middle school (8th standard) * Written consent and willing to participate in the study * Diagnostic criteria for Treatment Resistant Depression: Thase and Rush staging method stage II * HAM-D scores 8-18 (mild to moderate level) * No medication changes for a month before and until the end of rTMS course | * Intellectual disability, epilepsy, head injury with loss of consciousness, substance abuse (except nicotine) * Cerebrovascular disease, neurodegenerative disorders * Systemic illnesses with known cerebral consequences * Intracranial implants, any other metal object inside or near the brain or cardiac pacemaker * Pregnant or breastfeeding women * ECT within a month * Bipolar disorder/ other psychiatric disorders | 45.38 (10.29)  39.86 (13.27) | None |
| Mittrach 2010 | * Right-handed schizophrenic inpatients (DSM-IV) * At least 3 episodes in their medical history   On stable antipsychotic medication (at least 2 weeks) and a co-medication of lorazepam (1 mg daily) was allowed | * Alcohol or substance dependence disorder in the last two years * Neurological disorders * Cardiac pacemaker   Hx brain trauma, seizures, or neurosurgery | 34.5 (0.5) 34.4 (10.5) | Technical support by MedTronic, Dusseldorf |
| Myczkowski 2018 | * Bipolar Disorder-I and Bipolar Disorder -II diagnoses (Psychiatrists: DSM-IV and MINI   Moderate severity depression (HDRS-17: >17) | * Other psychiatric disorders (unipolar depression, schizophrenia, substance dependence, dementia) or psychotic symptoms * Acute suicidal symptoms, rapid-cycling bipolar disorder, pregnancy * Neurologic disorders (stroke, TBI, epilepsy) * Severe personality disorders * Manic symptoms at baseline (Young Manic Rating Scale) >12 points   rTMS H-1 coil contraindications | 40.6 (9)  41.2 (11.7) | * CAPES/ Alexander von Humboldt fellowship * A consultant of the Neurocare group GmbH (Munich, Germany) * Received speaker's honorarium from Mag & More GmbH and neuroCare * Equipment support from neuroConn GmbH, Ilmenau, Germany, Mag & More GmbH, and Brainsway Inc., Jerusalem, Israel. * Partially funded by Brainsway |
| Nadeau 2014 | * MDD (DSM-IV criteria)   Diagnosis using structured clinical interview for DSM axis 1 disorders | NR | 48.5(10.8) 46.7(15.3) 46.6(20.2) 41.9(14.1) | * US Department of Veterans Affairs grant |
| Wen 2021 | * Han Chinese Age 18-70 years  Disease course > 1 year   Stable dose of antipsychotic medication for at least 1 month | * Any major physical diseases (cardiovascular, liver, kidney, gastrointestinal diseases) * Presence of a cardiac pacemaker, intracranial metal, or prior history of epilepsy or head injury * Active pregnancy, planning to become pregnant, or breastfeeding * Recent rTMS or modified ECT (within 1 month)   Hx alcohol or other substance abuse or dependence | 41.4 (7.5) 38.8 (9.1) | * Science and Technology Program of Wenzhou * Traditional Chinese Medicine Program of Zhejiang * Science and Technology Development Program of Nanjing Medical University |
| Wolwer 2014 | * Diagnosis of Schizophrenia (DSM-IV)   Hx 3 acute episodes. | * Alcohol or substance dependence in the last two years  Neurological disorders  Cardiac pacemaker   Hx brain trauma, seizures, or neurosurgery | 34.3 34.4 | * Technical support by Medtronic |
| XiuMh 2020 | * Male, Age 20-60 * No abuse or substance dependence except tobacco * No Hx rTMS or modified ECT   On stable doses of antipsychotic drugs for at least 1 year before study with unresolved negative symptoms (PANSS positive score < 24 and PANSS negative score > 20) | * Recent life stresses, and clinically significant affective disorders for at least 1 month prior to the study (SCID by research psychiatrist) * Physical diseases as cerebral pathologies * ECT therapy in past 3 months * Family Hx epilepsy * Pregnant/breastfeeding * < 5 Education years   Receiving or planning psychotherapy during or in the past 6 months of rTMS treatment | 52 (10.1) 54.7 (6.4) 50.7 (9.0) | * Scientific and Technological Program of Hebei |
| Yu  2022 | * MDD diagnosis: Two clinical psychiatrists using DSM IV * No change to antidepressant drugs taken within 1 month before and during treatment. * Right-handed * Normal or corrected to normal vision * Age 18–50 years | * Unstable physical conditions, pregnancy, and breastfeeding * TMS contraindication head injury, epilepsy, metal implants in the body, chronic or severe physical disease history, drug abuse history, intellectual disability * Prior TMS or ECT * Psychiatric disease history (e.g., bipolar disorder), but accompanying anxiety symptoms are allowed | 23.57 (8.35)  22.14 (4.68) | * National Natural Science Foundation of China * Natural Science Foundation of Anhui Province * Natural Science Foundation of Anhui Medical University |
| Zeng 2022 | * GAD diagnosis: DSM-5 * Age: 18 to 60 years * HAMA ≥14 * Able to provide informed consent | * Intracranial infection, tumors, or any metal objects in the body (pacemakers, stents, catheters, electrodes, and cochlear implants) * Serious and/or unstable medical illness * Pregnancy * Inability to comply with the intervention or assessment physically or mentally * TMS contraindications (such as epilepsy) | 39.8 (13.5)  42.6 (9.8) | * National key R&D Program of China * National Natural Science Foundation   of China   * President Foundation of Nanfang Hospital, Southern Medical University * Education Research Projects of Nanfang Hospital |
| Zhuo 2019 | * Inpatient units of Shanghai Mental Health Center * Age 20-60 years * Schizophrenia (DSM-IV-TR and Structured Clinical Interview) * On a stable dose of antipsychotic medication for at least 1month before study * Benzodiazepines use temporarily for no longer than 7 days, and stopped 24h before the cognitive testing and clinical assessment   PANSS Negative symptoms subscale score 20 or more | * Current DSM-IV-TR axis I disorder other than schizophrenia * Hx epilepsy or seizure * Significant or unstable neurologic disorder * Cardiac pacemaker * Hx brain injury or surgery * Any metal clips, plates, or other metal items in the head * Substance dependency * ECT within 3 months | 28.97 (7.4)  30.63 (8.25) | * Multidisciplinary Cross Research Foundation of Shanghai Jiao Tong University * Multidisciplinary Cross Research Foundation of Shanghai Jiao Tong University * Natural Science Foundation of Shanghai * Medical guidance project of Science and Technology Commission Shanghai Municipality * Shanghai Municipal Commission of Health and Family Planning Foundations * Shanghai Municipal Hospital Appropriate Technology Program * Shanghai Excellent Academic & Technology Leaders Program * Young Doctor Training Program * National Natural Science Foundation of China * Shanghai Key Laboratory of Psychotic Disorders * Shanghai Clinical Center for Mental Disorders * Early Psychosis Program of Shanghai Mental Health Center |
| **Other Psychiatric disorders - Open label studies (n= 9+5)** | | | | |
| AboAoun 2019 | * Age > 18 years * MDD (DSM-V) * No active psychotherapy * No more than one anti-depressant * Stable antidepressant dosage during study | * Psychotic episode * Neurological illness * Major head injury * Active alcohol or substance abuse * Seizure disorder * Current pregnancy | 52.17 (16.93)  42.85 (14.7) | * University of Manitoba Start-Up Fund and St. Boniface Hospital Foundation |
| Chen X, 2022 | * MDD diagnosis: DSM-V, two psychiatrists * Age 18-75 * Duration of Illness 12-64 months | * HAMD <26 * Severe physical or other diseases * Pregnancy or lactating * Inability to understand instructions | 54.23 (2.6) 51.53 (1.98) 56.73 (2.6) 54.04 (2.67) | * Nantong Science Foundation of Nantong City of China * Health Commission of Nantong City of China * Public Health Program of Nantong City |
| Demiroz  2022 | * Age 18-65 years * MDD - DSM-5 * Treatment resistance, without showing clinical remission after at least two different antidepressant lines at an effective dosage over a period of four weeks during the current depressive episode * HDRS score of at least 18 | * Comorbid psychiatric disorders, mental retardation, substance use disorder * Medical diseases (e.g., neurological disorders, cardiovascular and pulmonary system diseases, hepatic and renal failure, cancer, chronic infections) * ECT and/or rTMS within six months * Implant/pacemaker in the body * Pregnant or breastfeeding. | 45.21 (8.32)  44.21 (8.46) | * Research Fund of Konya Research and Training Hospital |
| Furtado 2013 | * Age18-65years * MDD (not bipolar)- HDRS Scale 17/20; DSM-IV-TR criteria * Diagnosis by Mini International Interview for Neuropsychiatric Disorders - study psychiatrist | * A concurrent or previous DSM-IV-TR axis I disorder (except an anxiety disorder) * DSM-IV-TR diagnosis of alcohol or substance dependence * Active medical problem and known neurological disease * Contraindication to rTMS /MRI (Hx seizure disorder, pacemaker, or metal) | 43.97 (10.4) | * National Health and Medical Research Council (NHMRC) and the Monash University Post Graduate Research Fund |
| Galletly 2016 | * MDD (DSM-IV criteria) on treatment onset | * Insufficient English skills for study assessments * Any neurological disorders; Hx of epilepsy * Metal plates/implants in their skull * Drug or Alcohol withdrawal | 51 (13.3) | * None |
| Hopman 2021 | * Age 18-64 years, right- handed * MDD (DSM-IV) or depressive disorder * MADRS score >20 * Treatment failure to one full course of antidepressant medication (>6 weeks) or medication intolerance or no clinical improvement with stable medication | * Hx significant head trauma, neurological disorders * Active abuse of alcohol or illegal substances * Current psychotic symptoms, suicide ideation or recent suicide attempts, other primary DSM-IV Axis I and II psychiatric diagnoses * Contraindications to MRI (pacemaker, metal implant, pregnancy) or rTMS, or ECT therapy in the prior year | 51.60 (4.81)  39.92 (11.77) | * Research Grant Council, Hong Kong |
| Hoy 2012 | * MDD or bipolar disorder-depressive episode * Age 18-70 years * Presence of moderate-to-severe depression (MADRS > 20) and treatment failure, or minimum of two courses of antidepressant medications for at least 6 weeks | * Change in the dose or type of antidepressant medications during, or in the 4 weeks prior to study | Overall: 41.86 (11.68)  40.81 (8.32)  41.35 (12.65)  46.84 (10.77)  40.02 (12.55) | * Post-Doctoral Training & Practitioner fellowship grants from the National Health and Medical Research Council * NARSAD Independent Investigator Award * Support from Neuronetics Ltd |
| Iznak 2015 | * Females, aged 18-56 years * Mild to moderate depressive disorders (ICD-10: F31.3, F33.0, F33.1, and F43.21) * Depressive symptoms (such as low mood, pessimistic views of life situations, anxiety, irritation, emotional lability, slowed movements and thinking, sleep disorders, and a lower working ability both at work and in daily life) * Insufficient anti-depressive therapy consistent with pharmaco-resistant depression | * NR | 36.3 (3.9) | * Russian Foundation for Humanities |
| Noda  2022 | * COVID-19: PCR positive, but were negative for coronary infection at the time of psychiatric consultation * First time depression or anxiety disorder (DSM-5) after COVID-19 infection * Severity score of 12 or higher on the MADRS scale * Written consent for the TMS Registry Study * Age 20-70 years | * Cerebral organic diseases (e.g., intracranial organic lesions of moderate severity or higher, neurodegenerative diseases, etc.) * Primary sleep disorders (sleep apnea, narcolepsy, etc.) * Bipolar disorder, schizophrenia, psychotic depression, or substance abuse/dependence * Active autoimmune or endocrine-metabolic disease (hypopituitarism, adrenal insufficiency, thyroid disease, diabetes, etc.) * Hx convulsive seizures or epilepsy * Serious or unstable physical illness that limits outpatient TMS treatment * ECT within the past 6 months * Pregnant women * TMS contraindications as metal implants or pacemakers * Deemed inappropriate for TMS by the treating physician. | 38.2 (11.7) | * None |
| Rostamai  2022 | * Depression diagnosis: Psychiatrist according to DSM-V * BDI-II scores equal and above 18 | * Incomplete TMS sessions | 33.58 (11.1) | * None |
| Schaffer 2020 | * Participants in the registry study | * Participant signed consent but did not initiate TMS treatment (n=5) * Participant initiated but did not complete the full treatment (n=11) * Participant did not have a diagnosis of MDD (n=11) * Participant received a high-frequency stimulation protocol (n=15) | 43.53 (15.15) 43.31 (14.13) | * None |
| Schulze-Rauschenbach 2005 | * MDD (DSM-IV) assessed by psychiatrist * No additional Axis I diagnosis * Unsuccessful treatment response to at least 2 types of antidepressants (sufficient dosage range, at least 4 weeks) * Age > 18 years * No Hx ECT or rTMS. | * No clinical exclusion criteria were present | 47.7 (13.1) 48.9 (13.8) 46.7 (11.0) | * None |
| Zhou 2021 | * Hx trauma * Brain injury by imaging with cognitive dysfunction * Age 20-70 years * Education junior high school or above * Stable breathing and circulation   No Hx CVD | * Hx mental illness * Head surgery, epilepsy, or meningitis * Unable to complete the survey due to hearing or speech barriers   Hx CI before the injury | 57.8 (3.8)  58 (3.9) | * Youth Science Foundation Projects of National Nature Science Foundation of China |
| Zhuo  2022 | * Schizophrenia diagnosis: DSM-IV * First episode, illness duration ≤ 6 months * Stable at the time of study participation * No additional mental disorder beyond schizophrenia * No severe physical illness or neurological comorbidities that can influence the study * No MRI contraindications * Evidence of cognitive impairment MATRICS Consensus Cognitive Battery (MCCB) * Score lower than the average for China and an MCCB-based Global Deficit Score ≥3. | * None | NR | * National Natural Science Foundation of China * National Key R&D Program of China * Key Projects of the Natural Science Foundation of Tianjin, China * Tianjin Health Bureau Foundation * Tianjin Science and Technology Bureau |
| **Healthy Older Adult – RCT & Open label study (n= 1 +(3) + 1)** | | | | |
| Cotelli 2010 | Normal physical exam and MMSE | * Subjective memory complaints or MMSE < 27 * Abnormal Neuropsychological test scores   Hx neurological disease, cardiovascular disease, psychiatric disorders or alcohol or other substance abuse | 70.2 | * Project grant from the “Fondazione della Comunità Bresciana-onlus” |
| Chen 2020 | * Self-reported persistent memory decline, confirmed by an informant * SCD- Questionnaire score > 5 * Normal MMSE and MoCA * CDR = 0 * Age 50-80 years   HAM-D <7. | * Hx CVA (modified HISS > 4) * Alcoholism, head injury, brain tumors, Parkinson’s disease, epilepsy, encephalitis, major depression, or other neurological or psychiatric illness * Any major medical illness * Severe visual or hearing loss * Inability to complete neuropsychological tests or Contraindication for MRI * MRI (T2-images) has major white matter changes, assessed by two radiologists * Hx or current use of psychotropic medications. | 70  (6.37)  72.20  (5.12) | * National Key Research and Development -program of China * National Natural Science Foundation of China * Medical Science and technology development Foundation - Nanjing Department of Health * Cooperative Research Project of Southeast University-Nanjing Medical University * Key Research and Development Plan Project of Jiangsu Province * Jiangsu Provincial Medical Talent project * Innovation and Entrepreneurship Training Program for College Students in Jiangsu Province * Key Scientific Research Projects of Colleges and Universities in Henan Province |
| Hermiller  2022 | * No history of neurological impairment or psychiatric disorders * No current use of drugs * Passed standard MRI and TMS safety screenings | * None | 23.7 (2.3)  66.5 (4.1) | * Awards R01-MH106512, R01-AG049002, T32-NS0479987, F31-NS111892, and F32-MH118718. * Neuroimaging was performed at the Northwestern University Center for Translational Imaging, supported by Northwestern University Department of Radiology. |
| Liu, M 2021 | * Age > 50 years * Primary school education or above * SCD -Q9 questionnaire score > 5 * Global cognitive function and daily life ability in good condition * Normal objective memory assessment   No other mental and neurological diseases | * Dementia, Hx CVA * A consciousness disorder, severely impaired vision, hearing, aphasia disorder, and other physical diseases that seriously affect neuropsychological testing * Severe primary diseases of liver, kidney, hematopoietic and endocrine systems * Mental illness, epilepsy, Parkinson's disease, DM, heavy alcohol use, drug abuse, and malignant tumors * rTMS contraindications (metal implantable devices, metal clips, plates, or rods, stents, filters, electrodes for vagal stimulation and ECT, pacemakers, pumps, hearing implants, or metal fragments) | 69.92 (1.93) | * National Natural Science Foundation of China * National Key R&D Program of China * Priority of Shanghai Key Discipline of Medicine * Project of the National Social Science Foundation of China * A Multimodal Corpus-based Study of the Pragmatic Competence of Elderly Patients with Alzheimer's Disease |
| Sole-Padulles 2006 | * Memory complaints for 1 year * Age 50 years and greater * No dementia   Low normal performance in RAVLT, Weschler memory scale revised or Benton Visual Retention test | * Other psychiatric or neurological diseases * HDS >15 | 66.95 (9.43)  68.68 (7.78) | * Spanish Ministerio de Educacio´ n y Culutra research project award * University of Barcelona * Spanish Ministry of Science and Technology * Generalitat de Catalunya |

**Supplemental Table 5:**

Studies included in this review categorized by country

|  |  |
| --- | --- |
| **Country** | **(n)** |
| China | 48 |
| Italy | 16 |
| USA | 13 |
| Australia | 6 |
| Germany | 6 |
| Canada | 5 |
| Israel | 5 |
| Taiwan  Turkey | 5  5 |
| Czech Republic | 4 |
| Egypt  Japan | 3  3 |
| France  Iran  Brazil | 3  3  2 |
| Korea | 2 |
| Mexico | 2 |
| Spain | 2 |
| Denmark | 1 |
| Hungary | 1 |
| Netherlands | 1 |
| Poland | 1 |
| Russia | 1 |
| UK  South Korea  India  Austria  Cyprus | 1  1  1  1  1 |
| **Total** | **143** |

Supplemental Table 6a: MMSE

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Treatment** | | | **Control** | | |
| **Study** | **N** | **Mean** | **SD** | **N** | **Mean** | **SD** |
| Ahmed, 2012 Mild/mod dem 1 Hz vs sham | 11 | 0.20 | 2.94 | 11 | 0.20 | 2.10 |
| Ahmed, 2012 Mild/mod dem 20 Hz vs sham | 10 | 3.00 | 2.33 | 11 | 0.20 | 2.10 |
| Ahmed, 2012 Severe dem 1 Hz vs sham | 4 | 0.00 | 1.44 | 4 | 0.30 | 1.64 |
| Ahmed, 2012 Severe dem 20 Hz vs sham | 5 | 0.60 | 1.41 | 4 | 0.30 | 1.64 |
| Bagattini, 2020 | 27 | 0.66 | 2.16 | 23 | 0.11 | 2.66 |
| Budak, 2023 | 10 | 2.00 | 4.10 | 17 | 1.65 | 3.22 |
| Cotelli, 2011 | 5 | -0.20 | 2.39 | 5 | 0.00 | 1.59 |
| Gy, 2021 Active vs Sham | 11 | 0.40 | 1.07 | 11 | -0.70 | 1.14 |
| Gy, 2021 Sham vs Active | 11 | 0.00 | 1.02 | 11 | -1.00 | 0.85 |
| Hu, 2022 rTMS-TDCS vs Single TDCS | 21 | 4.86 | 2.61 | 21 | 3.28 | 2.59 |
| Hu, 2022 Single rTMS vs Sham | 21 | 3.62 | 2.51 | 21 | 0.19 | 2.35 |
| Jia, 2021 | 35 | 1.46 | 4.54 | 34 | 0.56 | 5.22 |
| Koch, 2017 | 14 | 0.40 | 1.38 | 14 | 0.90 | 1.88 |
| Lee, 2016 | 18 | 1.50 | 3.18 | 8 | 1.75 | 3.62 |
| Li, X, 2021 | 37 | 2.03 | 0.52 | 38 | 0.16 | 0.51 |
| Liu C, 2021 | 25 | 2.16 | 2.78 | 12 | 0.14 | 1.62 |
| Padala, 2018 | 8 | 2.9 | 1.88 | 8 | -0.6 | 2.02 |
| Padala, 2020 | 9 | 1 | 3.14 | 10 | 0.1 | 3.07 |
| Saitoh, 2022 TMS 120% vs Sham | 15 | 1.5 | 2.27 | 12 | 0.5 | 2.3 |
| Saitoh, 2022 TMS 90% vs Sham | 13 | -0.7 | 2.21 | 12 | 0.5 | 2.3 |
| Wei, 2022 | 29 | 1.31 | 5.53 | 27 | 0.56 | 5.80 |
| Yao, 2022 | 15 | 3.33 | 3.13 | 12 | 0.40 | 3.83 |
| Zhang, 2019 | 15 | 3.27 | 0.56 | 13 | 0.75 | 0.49 |
| Zhao, 2017 | 17 | 1.70 | 2.07 | 13 | 5.00 | 5.52 |

RE Model (Q = 261.77, df = 23, p <0.001; I² = 96.68%)

Test for overall effect: Z= 2.93 (p=0.003)

Supplemental Table 6b: MoCA

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Treatment** | | | **Control** | | |
| **Study** | **N** | **Mean** | **SD** | **N** | **Mean** | **SD** |
| Esmaeili, 2020 Active vs Sham | 8 | 0.84 | 0.66 | 8 | 0.04 | 0.84 |
| Esmaeili, 2020 Sham vs Active | 8 | 2.1 | 0.83 | 8 | 0.75 | 0.57 |
| Gy, 2021 Active vs Sham | 11 | 2.4 | 1.45 | 11 | 0.43 | 1.17 |
| Gy, 2021 Sham vs Active | 11 | 2.45 | 1.18 | 11 | 1.44 | 1.55 |
| He, 2021 | 20 | 2.40 | 2.09 | 15 | -0.7 | 2.58 |
| Liu C, 2021 | 25 | 2.40 | 3.03 | 12 | 0 | 1.61 |
| Lu, 2022 | 27 | 2.2 | 1.94 | 28 | 1.89 | 2.89 |
| Saitoh, 2022 TMS 120% vs Sham | 15 | -1 | 4.15 | 12 | 1.3 | 2.83 |
| Saitoh, 2022 TMS 90% vs Sham | 13 | 0.7 | 2.76 | 12 | 1.3 | 2.83 |
| Yao, 2022 | 15 | 3.13 | 3.87 | 12 | 0.7 | 2.51 |

RE Model (Q = 47.90, df = 9, p <0.001; I² = 82.09%)

Test for overall effect: Z= 2.81 (p=0.005)

Supplemental Table 6c: ADAS-Cog

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Treatment** | | | **Control** | | |
| **Study** | **N** | **Mean** | **SD** | **N** | **Mean** | **SD** |
| Brem A-K, 2020 | 16 | -2.21 | 2.07 | 18 | 0 | 2.58 |
| Hu, 2022 rTMS-TDCS vs Single TDCS | 21 | -7.48 | 7.16 | 21 | -3.86 | 4.80 |
| Hu, 2022 Single rTMS vs Sham | 21 | -4.24 | 6.54 | 21 | 0.04 | 7.68 |
| Lee, 2016 | 18 | -4.28 | 5.96 | 8 | -1.76 | 5.53 |
| Li, X, 2021 | 37 | -2.89 | 4.64 | 38 | 0.05 | 3.66 |
| Liu C, 2021 | 25 | -6.04 | 6.29 | 12 | -0.3 | 2.12 |
| Rabey, 2013 | 7 | -3.76 | 1.32 | 8 | -0.47 | 1.18 |
| Saitoh, 2022 TMS 120% vs Sham | 15 | -1.3 | 3.75 | 12 | -0.3 | 3.98 |
| Saitoh, 2022 TMS 90% vs Sham | 13 | -1 | 3.86 | 12 | -0.3 | 3.98 |
| Vecchio, 2021 | 30 | -1.3 | 1.16 | 33 | -0.57 | 1.49 |
| Wu, 2015 | 26 | -5.92 | 4.44 | 26 | -1.67 | 4.58 |
| Yao, 2022 | 15 | -2.79 | 3.22 | 12 | -1.1 | 2.31 |
| Zhang, 2019 | 15 | -3.37 | 0.67 | 13 | -0.84 | 0.69 |
| Zhao, 2017 | 17 | -4.1 | 4.40 | 13 | -1.3 | 6.36 |

RE Model (Q = 44.05, df = 13, p <0.001; I² = 75.73%)

Test for overall effect: Z= -5.28 (p<0.001)

**Supplemental Table 7: Cochrane Risk of Bias quality assessment for RCT studies**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Study/ Year | Random Sequence generation | Allocation Concealment | Blinding of Participants and Personnel | Blinding of outcome assessment | Incomplete Outcome data | Selective reporting | Other bias |
| Ahmed 2012 | Low | Low | Unclear | Low | Unclear | Unclear | Unclear |
| Alcala-Lozano 2018 | Unclear | Unclear | Unclear | Unclear | Unclear | Unclear | High |
| Budak 2023 | Low | High | High | Unclear | Low | Low | Low |
| Brem A-K 2020 | Low | Low | Low | Unclear | Unclear | Unclear | Low |
| Cheng, J 2021 | Low | Low | Low | Unclear | Unclear | Unclear | Unclear |
| Cotelli 2011 | Unclear | Unclear | Unclear | Low | Unclear | Low | Unclear |
| Hu 2022 | Low | Low | Low | low | Unclear | Low | Low |
| Jia 2021 | Low | Unclear | Low | Low | Low | Low | Low |
| Jiang 2021 | Low | Unclear | Low | Low | Unclear | Unclear | Unclear |
| Koch 2017 | Unclear | Unclear | Low | Low | Unclear | Unclear | Unclear |
| Koch 2022 | Low | Low | Low | Low | Unclear | Low | Low |
| Kumar 2020 | Low | Low | Low | Low | Unclear | Low | Low |
| Leblhuber 2022 | Unclear | Unclear | High | Unclear | Unclear | Low | High |
| Lee 2016 | Unclear | Low | Low | Low | Unclear | Low | Unclear |
| Lee 2020 | Unclear | Unclear | High | High | Unclear | Unclear | High |
| Leocani 2021 | Low | Low | Low | Low | Low | Low | Low |
| Li, X 2021 | Low | Unclear | Low | Low | Unclear | Low | Low |
| Lithgow 2021 | Unclear | Unclear | Low | Low | Low | Low | Low |
| Liu, C 2021 | Unclear | Unclear | High | Low | Unclear | Low | High |
| Lu 2022 | Low | Low | Low | Low | Unclear | Low | Low |
| Padala 2020 | Low | Unclear | Low | Unclear | Unclear | Low | Low |
| Qin 2022 | Low | Low | Low | Low | Unclear | Low | Unclear |
| Rabey 2013 | Unclear | Unclear | Low | Low | Unclear | Low | Unclear |
| Rutherford 2015 | Unclear | Unclear | Low | Low | High | Low | Unclear |
| Sabbagh 2019 | Low | Low | Low | Low | Unclear | Low | Low |
| Saitoh 2022 | Low | Low | Low | Low | Low | Low | Low |
| Tao, 2022 | Low | Unclear | Unclear | Low | Unclear | Low | High |
| Turriziani 2019 | Unclear | Unclear | Unclear | Unclear | Low | Unclear | High |
| Vecchio 2021 | Unclear | Unclear | Low | Unclear | Low | Low | High |
| Wei 2022 | Low | Low | Low | Low | Unclear | Low | Low |
| Wu 2015 | Low | Unclear | Low | Low | Unclear | Low | Low |
| Wu 2022 | Low | Low | Low | Low | Low | Low | Low |
| Yao 2022 | Low | Unclear | Low | Low | Unclear | Low | Low |
| Zhang 2019 | Low | Unclear | High | Low | Unclear | Low | High |
| Zhao 2017 | Unclear | Unclear | Low | Low | Unclear | Low | Low |
| Zhou 2022 | Low | Unclear | Low | Unclear | Unclear | Low | Low |
| Bagattini 2020 | Unclear | Unclear | Low | Low | Unclear | Low | Low |
| Eliasova 2014 | Low | Unclear | Unclear | Unclear | Unclear | Unclear | High |
| Chen 2021 | Unclear | High | Unclear | Unclear | Low | Unclear | Unclear |
| Cui 2019 | Low | Low | Low | Low | Unclear | Low | Low |
| Drumond Marra 2015 | Low | Low | Low | Low | Unclear | Low | Low |
| Esmaeili 2020 | Low | Low | Low | High | Unclear | Unclear | Low |
| Esposito 2022 | Low | Unclear | Low | Low | Unclear | Low | Low |
| Gy 2021 | Low | Low | Low | Unclear | Low | Low | Low |
| He 2021 | Low | Low | Low | Low | Low | Unclear | Unclear |
| Padala 2018 | Low | Low | Low | Low | Low | Low | Low |
| Pan 2020 | Unclear | High | Unclear | High | Unclear | Unclear | High |
| Rektorova 2005 | Unclear | Unclear | Unclear | Low | Unclear | Low | High |
| Sedlackova 2008 | Unclear | Unclear | Unclear | Unclear | Unclear | Low | High |
| Yuan 2021 | Low | Unclear | Low | Low | Unclear | Low | Unclear |
| Barwood 2013 | Low | Low | Low | Low | Unclear | Unclear | Low |
| Cheng, TS 2021 | Low | Low | High | Low | Unclear | Unclear | High |
| Chu 2022 | Low | Unclear | Unclear | Unclear | Low | Low | High |
| Groiss 2012 | Unclear | High | Low | Unclear | Unclear | Low | Low |
| Hill 2020 | Unclear | Unclear | Low | Low | Low | Low | Unclear |
| Hu 2018 | Unclear | Unclear | High | Unclear | Unclear | High | High |
| Huang 2023 | Low | Low | Low | Low | Low | Low | Low |
| Khedr 2019 | Low | Low | High | High | Unclear | Unclear | High |
| Ko 2014 | Low | Low | Low | Low | Unclear | Low | Low |
| Li 2020 | Low | Low | Low | Low | Low | Low | Low |
| Li, H 2021 | Low | Unclear | High | High | Unclear | Low | High |
| Margolis 2019 | Unclear | Unclear | High | Unclear | Unclear | Low | High |
| Medina 2012 | Unclear | Unclear | High | Unclear | Unclear | Unclear | High |
| Pytel 2021 | Low | Low | Low | Low | Unclear | Low | Low |
| Srovnalova 2012 | Unclear | Unclear | High | Low | Unclear | Low | High |
| Trung 2019 | Low | Unclear | High | Unclear | Unclear | Low | High |
| Tsai P-Y 2020 | Low | Low | Low | Low | Unclear | Low | Low |
| Wei 2021 | Unclear | Unclear | Unclear | Unclear | Low | Low | High |
| Yin 2020 | Low | Unclear | High | Low | Unclear | Low | High |
| Yingli 2022 | Low | Unclear | Unclear | Low | Unclear | Low | High |
| Buchholtz 2020 | Low | Low | Low | Low | Unclear | Low | Low |
| Cheng 2016 | Unclear | Unclear | Unclear | Unclear | Unclear | Unclear | High |
| Guan 2020 | Low | Unclear | Low | Low | Low | Low | Low |
| Guse 2013 | Low | Unclear | Low | Low | Unclear | Low | Low |
| Hasan 2016 | Low | Unclear | Low | Low | Low | Low | Low |
| Hausmann 2004 | Unclear | Unclear | Low | High | Low | Low | Low |
| Holczer 2021 | Low | Unclear | Unclear | Unclear | Low | Unclear | Unclear |
| Hou 2022 | Unclear | Unclear | Unclear | Unclear | Unclear | Unclear | High |
| Hoy 2019 | Low | Low | Low | Low | Low | Unclear | Low |
| Jagawat 2022 | Low | Low | Low | Low | Low | Low | Low |
| Mittrach 2010 | Low | Unclear | Low | Low | Unclear | Low | Low |
| Myczkowski 2018 | Low | Low | Low | Unclear | Unclear | Low | Low |
| Nadeau 2014 | Unclear | Unclear | Unclear | Unclear | Low | Low | High |
| Wen 2021 | Low | Unclear | Low | Low | Unclear | Unclear | High |
| Wolwer 2014 | Low | Low | Low | Low | Unclear | High | Unclear |
| Xiu 2020 | Low | Low | Low | Low | Low | Low | Low |
| Yu, 2022 | Unclear | Unclear | Low | Low | Unclear | Low | Unclear |
| Zeng, 2022 | Low | Low | Low | Low | Low | Low | Low |
| Zhuo 2019 | Unclear | Unclear | Low | Unclear | Unclear | Low | High |
| Jiang 2021 | Low | Unclear | Low | Low | Unclear | Unclear | Unclear |
| Chen 2020 | Unclear | Unclear | High | Unclear | Unclear | Unclear | High |
| Hermiller 2022 | Unclear | Unclear | Unclear | Unclear | Unclear | Low | High |
| Sole-Padulles 2006 | Unclear | Unclear | Low | Low | Unclear | Low | Low |

Low: Low risk of Bias; High: High risk of Bias; Unclear: Unclear risk of Bias

**Supplemental Table 8: MINORS criteria quality assessment for non-RCT studies**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Study name/ Year | Clearly stated Aim | Inclusion of consecutive patients | Prospective data collection | Endpoint appropriate to the aim of the study | Unbiased assessment of the study endpoint | Follow-up period appropriate to the aim of the study | Loss to follow-up less than 5% | Prospective calculation of the study size |
| Avirame 2016 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Bentwich 2011 | 2 | 0 | 2 | 2 | 0 | 2 | 1 | 0 |
| Cotelli 2006 | 2 | 1 | 1 | 2 | 0 | 0 | 1 | 0 |
| Cotelli 2008 | 2 | 0 | 1 | 2 | 0 | 0 | 0 | 0 |
| Devi 2014 | 2 | 0 | 0 | 2 | 0 | 1 | 0 | 0 |
| Gandelman-Marton 2017 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Golaszewski 2021 | 2 | 0 | 1 | 1 | 2 | 1 | 0 | 1 |
| Guo 2021 | 2 | 0 | 1 | 1 | 1 | 1 | 0 | 0 |
| Hanoglu 2022 | 2 | 0 | 0 | 2 | 0 | 1 | 2 | 0 |
| Kayasandik 2022 | 2 | 0 | 1 | 2 | 1 | 2 | 1 | 2 |
| Mano 2022 | 2 | 0 | 1 | 2 | 2 | 2 | 1 | 0 |
| Nguyen 2017 | 2 | 0 | 1 | 2 | 0 | 2 | 2 | 0 |
| Rabey 2016 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 0 |
| Suarez Moreno 2022 | 2 | 2 | 0 | 2 | 1 | 2 | 1 | 0 |
| Teti Mayer 2021 | 2 | 0 | 1 | 2 | 0 | 1 | 1 | 0 |
| Traikapi 2022 | 2 | 0 | 2 | 2 | 2 | 2 | 2 | 0 |
| Velioglu 2021 | 2 | 0 | 2 | 2 | 1 | 1 | 2 | 2 |
| Wu 2020 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Xiao 2022 | 2 | 0 | 2 | 2 | 1 | 2 | 1 | 0 |
| DiLorenzo 2020 | 2 | 2 | 2 | 2 | 1 | 2 | 1 | 0 |
| Lv 2023 | 2 | 0 | 1 | 2 | 1 | 2 | 2 | 0 |
| Tumasian 2021 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| Yang 2022 | 2 | 0 | 0 | 2 | 0 | 1 | 1 | 0 |
| Chen, Yu 2022 | 2 | 0 | 1 | 2 | 1 | 1 | 1 | 0 |
| Trebbastoni 2016 | 2 | 2 | 2 | 2 | 0 | 2 | 1 | 0 |
| Turriziani 2012 | 2 | 0 | 0 | 1 | 0 | 0 | 2 | 0 |
| Zhang, X 2022 | 2 | 0 | 1 | 2 | 0 | 2 | 2 | 0 |
| Antczak 2018 | 2 | 0 | 1 | 1 | 0 | 1 | 2 | 0 |
| Cha 2022 | 2 | 0 | 2 | 2 | 2 | 2 | 1 | 0 |
| Cotelli 2012 | 2 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| Eydi Baygi 2022 | 2 | 0 | 1 | 2 | 1 | 2 | 2 | 0 |
| Shehata 2015 | 1 | 0 | 1 | 2 | 0 | 2 | 1 | 0 |
| Neri 2021 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| AboAoun 2019 | 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Chen, X 2022 | 2 | 0 | 1 | 2 | 1 | 2 | 1 | 0 |
| Demiroz 2022 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 0 |
| Furtado 2013 | 2 | 0 | 1 | 2 | 0 | 1 | 0 | 0 |
| Galletly 2016 | 2 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| Hopman 2021 | 2 | 0 | 2 | 1 | 1 | 1 | 2 | 0 |
| Hoy 2012 | 2 | 0 | 0 | 1 | 2 | 1 | 0 | 0 |
| Iznak 2015 | 2 | 0 | 1 | 1 | 0 | 1 | 2 | 0 |
| Noda, 2022 | 2 | 0 | 0 | 2 | 0 | 2 | 2 | 0 |
| Rostami 2022 | 2 | 0 | 0 | 2 | 1 | 2 | 0 | 0 |
| Schaffer 2020 | 2 | 0 | 2 | 1 | 0 | 1 | 2 | 0 |
| Schulze-Rauschenbach 2005 | 2 | 2 | 1 | 1 | 0 | 1 | 1 | 0 |
| Zhou 2021 | 2 | 0 | 1 | 2 | 1 | 1 | 0 | 0 |
| Zhuo 2022 | 2 | 0 | 1 | 2 | 1 | 2 | 1 | 0 |
| Cotelli 2010 | 2 | 0 | 1 | 2 | 0 | 1 | 0 | 0 |
| Liu, M 2021 | 2 | 0 | 1 | 1 | 2 | 1 | 1 | 0 |

2- Reported, adequate; 1- Reported, inadequate; 0- Not Reported

