Les fièvres, les chocs et les convulsions

J.A. Micoulaud Franchi / C. Daudet

Mardi 1er Février 2022- séminaire 1 Bordeaux visioconférence

DIU « pratique et théorie de l'éléctroconvulsivothérapie »

Du bon usage des fièvres

- « Donnez-moi le pouvoir de provoquer la fièvre et je guérirai tous les maux » Parménide (Ve siècle av. JC)

- « chez un malade en proie aux convulsions et au tétanos (*affections froides*) , une fièvre survenant résout la maladie » Hippocrate (Ve-Ive siècle av. JC)
- Fièvre « quarte » par émanation des zones marécageuses, région des Fenlands (XVIIIe siècle)

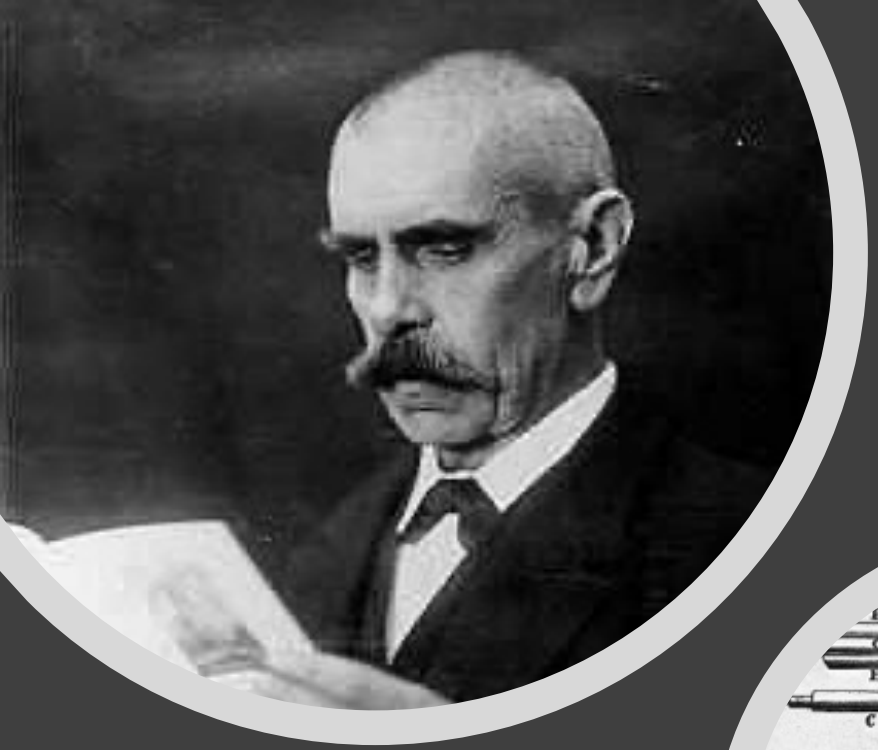
L'hellébore et le camphre

- L'hellébore comme purgatif drastique mais connu pour ses propriétés proconvulsivantes, Oribase (IVe siècle)

- Les convulsions camphrées, Paracelse (***XVIe siècle):***
- Appliqué à la manie XVIIIe au XIXe siècle
- ***1765*** *London Medical Journal ,* Oliver (1 cas de manie)
- 1764 Von Auebrugger « mania vivorum » traitée par ingestion de camphre/ 2h jusqu'à convulsion

Traitement de « choc »

- Terme médical, pouvoir thérapeutique des chocs
- Dès l'Antiquité, idée de guérir un désordre mental par un bouleversement total mais bref de l'ensemble des fonctions organiques et psychiques: chute d'une falaise, tête maintenue sous l'eau, vertiges rotatoires…
- Ou en faisant frôler la mort, brûlures, privation de nourriture, saignées et immersion dans de l'eau bouillante ou glacée.
- ***1926*** théorisation de la « thérapie de choc » par Constance Pascal
- Face à un arsenal thérapeutique limité….
- ….des méthodes empiriques…
    - …allant de la secousse thérapeutique à la mise au repos
    - Cure de sommeil aux barbituriques, Klaesi (1921)



Modèle moderne de la malaria-thérapie

- ***1917***, Prof. Julius Wagner-Jauregg, université de Vienne
- Amélioration de 6/9 patients neurosyphilitiques (démentia paralytica) par induction de malaria
- Prix Nobel de Médecine 1928
- Nouveau paradigme en psychiatrie:
- induire un autre trouble:
    - Comas insuliniques 1933
    - Thérapie convulsive 1934
    - leucotomie 1935

- Xénotransfusion, Denis, 1667

L’insulinothérapie « ou l’accident »

- Synthèse de l’insuline en 1922, utilisation courante en psychiatrie fin 20’, notamment addiction opiacés (héroïne, morphine) (Sakel, 1930)
- Diplomé en médecine en 1925 à Vienne
- Intègre un sanatorium psychiatrique périphérie de Berlin
- Accident de traitement insulinique de sevrage aux opiacés chez un patient schizophrène: coma hypoglycémique ====> amélioration
- ***3 Novembre 1933***, réunion Société Médicale de Vienne: annonce « nouveau type de traitement pour la schizophrénie et l’excitation confuse »
- 1935, encart d’un paragraphe dans un hebdomadaire médical

Et après

- Émigre à New York en 1937
- Murray Hill Hotel, Park Avenue: réalise dans sa suite des subcomas insuliniques à prix d'or
- Slocum clinic, Beacon, NY
- Ennemi juré de Meduna
- Probable épisode maniaque au World Congress of Psychiatry à Paris en 1950
- A pu se plaindre de dépression
- Meurt à 57 ans, IDM
- Laisse 2 millions de $
- Sakel observa 20% de crises convulsives, interprétée comme risque à éviter.
- Essais randomisés contrôlés contre chlorpromazine: aussi favorables sans la morbidité/mortalité, ni les soins de nursing du coma
- Les cures de Sakel: thérapie convulsive inefficace?

Lazlo Meduna: du camphre…

- Institut Schaffer, fin des années 1920’
- Études post-mortem: prolifération de tissu glial en cas d’épilepsie, absence en cas de démentia praecox
- Études épidémiologiques en populations asilaires: absence d’épilepsie
- Rapport de cas de rémission de démentia praecox après crise d’épilepsie (traumatisme crânien ou méningite)
- Hypothèse d’un antagonisme épilepsie/démentia praecox
- Études précliniques animales (choix du camphre)
- Essai clinique rigoureux reprenant le protocole de la malariathérapie (3-4 j d’intervale)
- Publication in extenso (27 p.) du premier essai clinique, Comprehensive Journal of Psychiatry and Neurology, ***1935***
- 26 patients, dose moyenne 5.6g, 10 rémissions (128 injections/62 crises), 13 sans bénéfice (225 injections/25 crises)
- Monographie « Die konvulsiontherapie der Schizophrenie », 1937: 110 patients dont vignettes des 53 traités avec succés

Les 11 premiers patients

- Institut Royal National Hongrois, Budapest-Lipometzo, ***23 janvier 1934***, 10H30
- Zoltan L., 37 ans, marié, électricien
- Lazlo Meduna, autobiographie 1985

- 10ème de 11 patients traités entre le 2 janvier et le 16 avril 1934
- 9/11 anorexie, 7/11 catatonie, 8/11 maladie>2ans
- Titration lors des 1ères séances (2,4,8 g, injection intraveineuse huile de Camphre)
- Délai d'induction de 30 à 90', durée de 30 à 120'', 3 crises secondaires
- 3/11 amélioration marquée, 4/11 n'apparaissent pas dans l'article de 1935
- Z.L. s'est amélioré le 10/02, G.Y.H. le 14/02 et J.W. le 03/03
- Conclut à l'inefficacité du camphre comme agent convulsivant
- Facteur prédictif positif: moins longue durée de maladie
- Notion de tolérance au camphre (anticipe le seuil épileptogène)

...au pentylenetetrazol

- Choix du pentylenetetrazol (Cardiazol en Europe, Metrazol aux USA)
- Délai d'induction d'1'
- Thérapie adoptée internationalement sous 2 ans
- Émigre aux USA en 1939
- Loyola University puis Illinois Psychiatric Institute, Univerity of Illinois, Chicago, modeste activité privée
- Abandonne les convulsions chimiques avec l'apparition des convulsions électriques
- Participe à la fondation de la Société de Psychiatrie Biologique
- Meurt en 1964, peu fortuné

Les pionniers de l’électroconvulsivothérapie

- L.Bini visite Meduna pour l’intérêt de la thérapie convulsive (penthylenetetrazol)
- U.Cerletti, directeur de département, clinique psychiatrique de Rome, a induit des crises convulsive chez le chien, par stimulation électrique (thèse de doctorat)

Naissance de l’électroconvulsivothérapie

- Électrodes cranio-caudales: mort des chiens après l’induction (arrêt cardiaque)
- Visite abattoirs de Rome: électrodes bi-temporales

- Essais cliniques:
- L’échec: L.F., ***20 Avril 1938***, puis
- Patient milanais de 39 ans, 15 Mai 1938
- Courant alternatif non-modifié (220 V, 1’’)

Et après?

- U.Cerletti : libération de substances porteuses de l’effet thérapeutique
- études animales: ECS (porc), émulsion de cerveaux, agonines (1947) acragonines (1948)
- Très impliqué dans la recherche: Nissl (Heidelberg), Kraeplin (Munich), Pierre Marie (Paris)
- Épidémiologie (goître), psychanalyse, matériel militaire
- Refus de la faculté de médecine de lui renouveler son poste (1947)
- L’école romaine de neuropsychiatrie s’éteint avec lui (mouvement antipsychiatrique)

Survol des évolutions classiques

Facilité et succès (dementia praecox)==> utilisation extensive

- 1940 : efficacité/ dépression, agitation et idées paranoïde de la mélancolie
- Mi 40’: large spectre de troubles, homosexualité, toxicomanie, alcoolisme, phobie et conversion ==>échecs ==> plaintes d’abus
- Indications classiques:
  - Dépression délirante
  - Pseudo-démence
  - Dépression du sujet âgé
  - Catatonie
  - Schizophrénie et troubles schizo-affectifs
  - Manie
  - « Dernier ressort »

Déclin de l’ECT

- début de l’ECT, alternatives: coma insulinique, psychochirurgie, psychothérapie et psychanalyse
- Mi 40’: Group for the Advancement of Psychiatry (Menninger) dénonce l’ECT dès sa fondation
- 1950’: psychotropes remplacent thérapies somatiques, mais tardent à remplacer les psychothérapies
- 1970’: Résistance thérapeutique: l’ECT est reconsidéré mais: guerre du Vietnam, antipsychiatrie, église de scientologie
- Pression pour restriction légale de l’ECT, 5 états: Californie, 1974 --- Texas, 1993

1980’-2000’

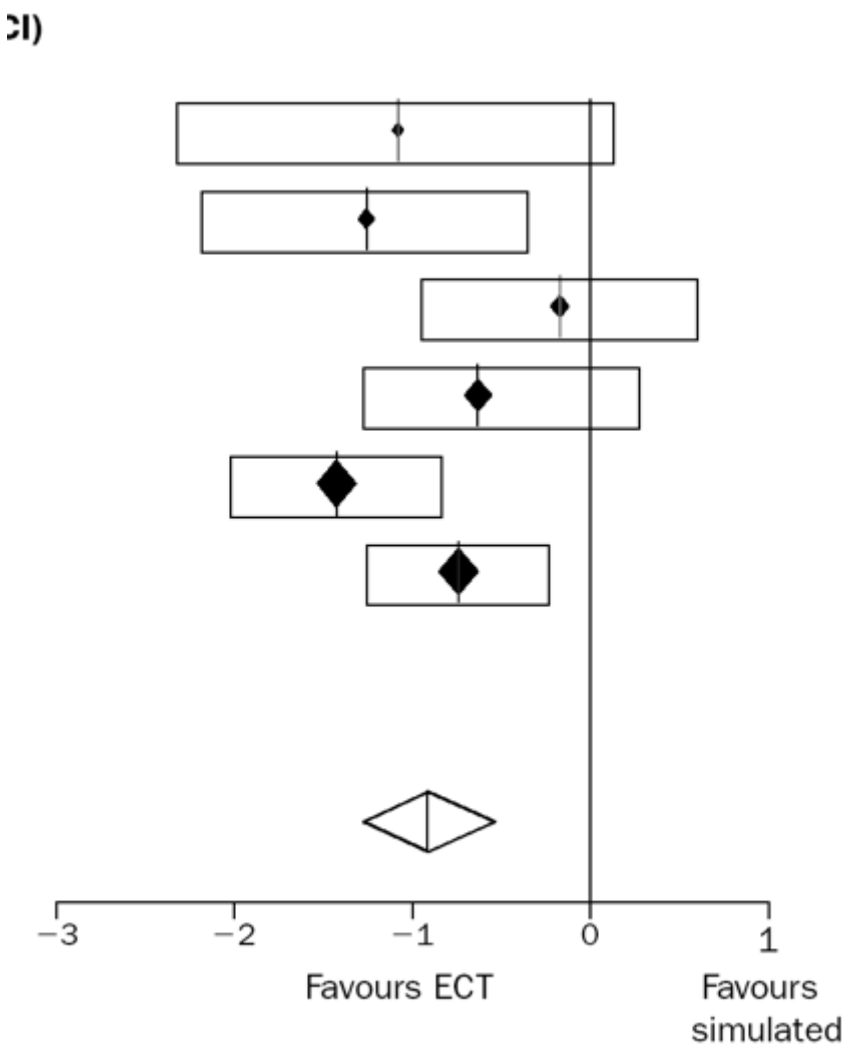
- L’ère des recommandations et de l’EBM
- Conférence de conscensus, 10 au 12/06/1985 au NIH
- APA: (1978), 1990, 2001
- RCP: 1989, 1995
- FFP (et ANAES): 1997 (149 rèfs, 26 fr)

- 1979, publication par M.Fink:« Convulsive Therapy: Theory and Practice » (Raven Press, NY, 1979)
- Juin 1984, Florence, M.Fink et A.Edelson decident de lancer « convulsive therapy »
- 1er numéro: Mars 1985

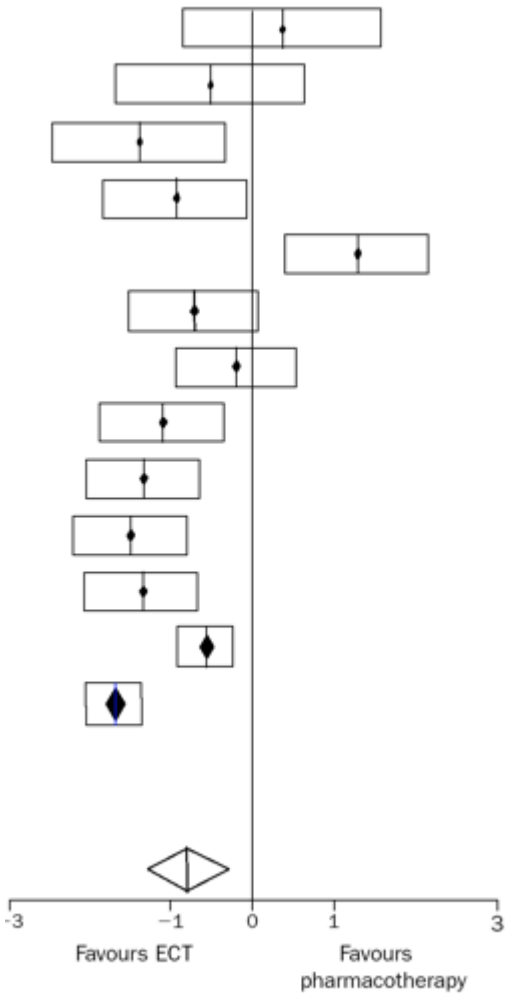
ECT Practitioner's Day King's Fund 11 Octobre 2002

- UK ECT review Group (The Lancet, 2003)
- Patient's perspectives on ECT: a systematic review (Rose, 2003)
- Recommandations du groupe de consensus
- Guidance on the use of ECT, Technology Apraisal 59, NICE 2003

UK ECT Review Group (revue systématique Cochrane)
The Lancet, 2003; 361: 799-808



ECT vs. sham ECT (placebo)
9 études, 256 sujets
(1963-1985)



ECT vs. médicaments
18 études, 1144 sujets
(1962-2000)

Recommandations Consensus Group

- Dépression sévère:
  - risque suicidaire, risque vital
  - car. psychotique, car. mélancolique
  - pharmaco-résistance vraie
  - choix du patient
- Manie:
  - risque vital, épuisement physique
  - pharmaco-résistance
  - choix du patient
- Schizophrénie :
  - 4éme ligne (résistance ou intolérance à la clozapine)
- Catatonie:
  - inefficacité du lorazapam

Patient’s perspective on electroconvulsive therapy: a systematic review (Rose, 2003)

- 29 à 79% des patients rapportent des pertes de mémoire
- Les tests neuropsychologiques de routine utilisés n’évaluent pas les pertes de mémoire rapportés par les patients
- La satisfaction du patient dépend de la méthode de recueil

NICE guidance 2003

- Dépression sévère
- Catatonie
- Manie sévère ou prolongée

- « Uniquement pour une amélioration rapide et à court terme, après échec d'essai correct d'alternatives thérapeutiques et/ou en cas de risque vital »
- « L'utilisation générale de l'ECT pour la schizophrénie n'est pas recommandé »
- « Tant que les risques et bénéfices à long terme de l'ECT ne sont pas clairement établis, l'ECT-M pour la dépression n'est pas recommandé »

NICE media briefing 2003

- « le comité a porté une attention particulière à l'expérience subjective des effets secondaires, notamment l'altération cognitive après l'ECT. Il apparaît que cette altération outrepasse souvent la perception de tout bénéfice lié au traitement. Ces éléments ont beaucoup comptés dans la décision du comité de restreindre …aux situations d'épuisement d'alternatives thérapeutiques ou de risque vital. »

Comité special ECT RCP

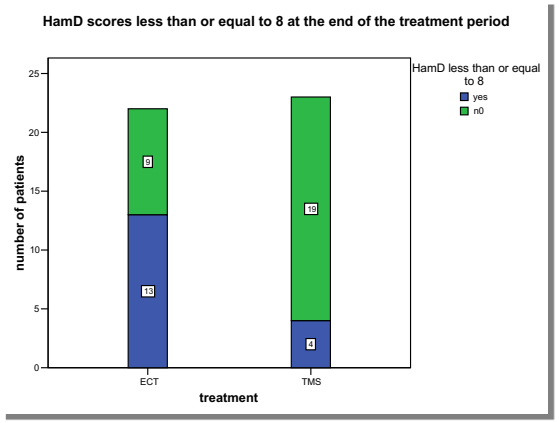
Information documentée sur le risque d'amnésie rétrograde, en particulier sur la mémoire autobiographique

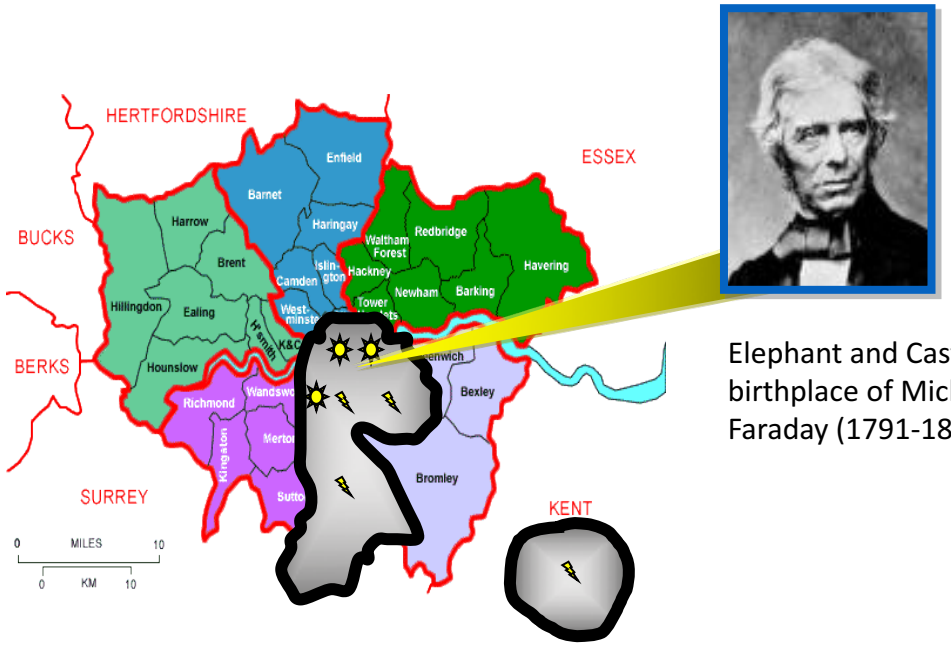
En l'absence de risque vital, privilégier une tentative par ECT-UL 3ST au moins.

Une augmentation de l'utilisation de l'ECT-UL devrait être favorisée.

Les méta-analyses et rTMS vs ECT

- 1999, Nahas recense les essais
- 2001, McNamara: 5/7 études, n=81
- 2003, Aare: 12 essais
- 2003, Martin: 14 essais, faiblesse méthodo.
- 2005, Couturier: 6/19 études, actif=contrôle, faiblesse méthodologique
- 2006, Fregni: 6 études, facteurs négatifs (âge et TRD)
- 2006, Herrmann: 33 études, actif > placebo
- 2007, Brunelin: 30/66 études, facteurs positifs (âge, réponse TMS, pas de car. Psych.)
- 2007, Gross: protocoles récents>anciens





Elephant and Castle, birthplace of Michael Faraday (1791-1867)

- McLoughlin 2007

Les premiers travaux

- Modification de l'humeur chez le sujet sain
    - Brickford, 1987: stim.cortex moteur, ⇑ humeur
    - Pascual-Leone, 1991: pleurs (speech arrest)
    - Pascual-Leone, 1996: tristesse à gauche, joie à droite (haute fréquence), cross-over
    - George, 1996: idem, jours différents

Traitement de la dépression

1993, Hofflich, 2 cas

1995, George, Grisaru, Kolbinger (6, 10, 15 patients)

==>1999, dz protocoles ouverts (hétérogènes)

1996, Pascual-Leone: n=17, cross-over, 10 Hz, 5 sessions

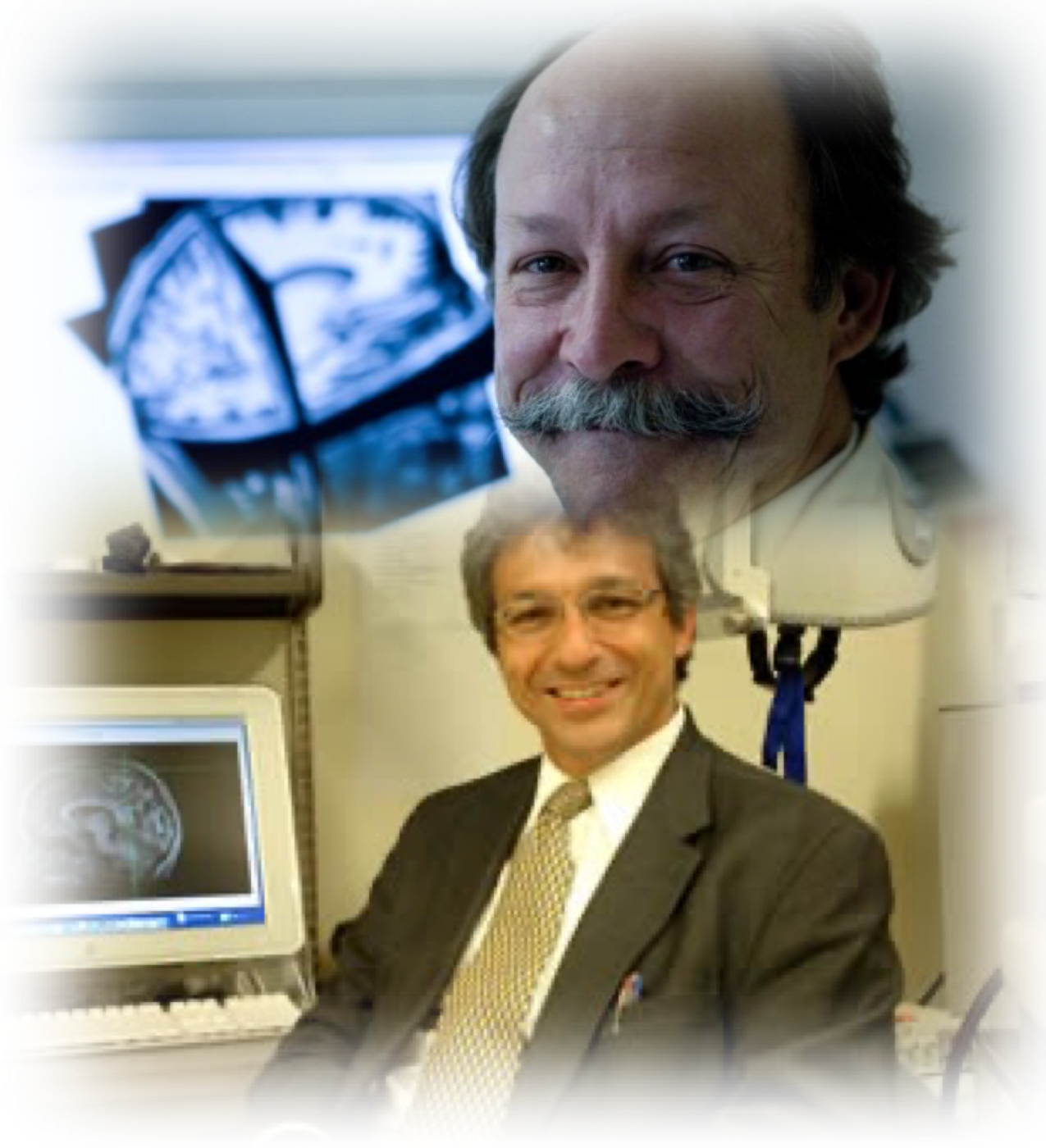
1997, George: n=12, cross-over, 20 Hz, 10 sessions

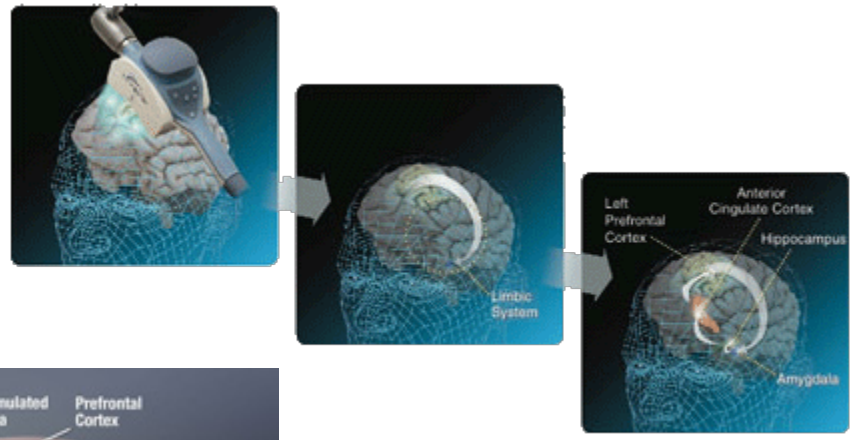
1998, Nahas/Padberg: insu, bras parallèles,LDLPFC

1999, Klein: n=71, insu, bras parallèles, 1 Hz, 10 sessions

1999, Loo: 10 Hz, 10 sessions, LDLPFC, actif=contrôle

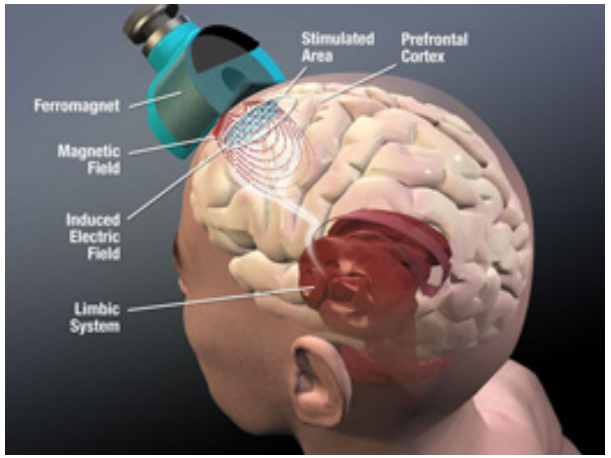
==>2007: 66 études





O'Reardon: 1er essai sponsorisé par l'industrie:

===> 8 Octobre 2008, approbation FDA



Neuronetics, Inc.
Malvern, USA

- étude randomisée contrôlée en double aveugle
- 23 sites (USA, Australie, Canada)
- Janvier 2004 à Août 2005.
- 20 Hz LDLPFC, 6 semaines (3000 pulses, 120% SM)
- N=301, sans mdct, échec d'1 ADP
-

rTMS: evidence-based guidelines 2014 (dès 2011)

Neuropathic pain	Definite analgesic effect of HF rTMS of M1 contralateral to pain side (Level A)
	LF rTMS of M1 contralateral to pain side is probably ineffective (Level B)
	No recommendation for cortical targets other than M1 contralateral to pain side
CRPS type I	Possible analgesic effect of HF rTMS of M1 contralateral to pain side (Level C)
Fibromyalgia	No recommendation for HF rTMS of the left M1 or DLPFC or for LF rTMS of the right DLPFC
Migraine	No recommendation for HF rTMS of the left M1 or DLPFC
Visceral pain	No recommendation for LF rTMS of the right S2 or for HF rTMS of the left DLPFC
Parkinson's disease	Possible antiparkinsonian effect of HF rTMS of bilateral (multiple) M1 regions (Level C)
	No recommendation for LF or HF rTMS of unilateral M1 representation of the hand
	No recommendation for rTMS of M1 and DLPFC using a non-focal coil or iTBS
	No recommendation for LF or HF rTMS of SMA or dPMC
	No recommendation for LF or HF rTMS of SMA, M1, or DLPFC or for cTBS of the cerebellum in levodopa-induced dyskinesia of PD patients
	Probable antidepressant effect of HF rTMS of the left DLPFC in PD patients (Level B)
Dystonia	No recommendation for LF rTMS of dPMC, M1, or S1
Essential tremor	No recommendation for LF rTMS of the cerebellum
Tourette's syndrome	No recommendation for LF rTMS of SMA, dPMC, or M1
Motor stroke	Possible effect of LF rTMS of the contralesional motor cortex in (post-)acute motor stroke (Level C) and probable effect in chronic motor stroke (Level B)
	Possible effect of HF rTMS of the ipsilesional motor cortex in (post-)acute and chronic motor stroke (Level C)
	No recommendation for cTBS of the contralesional motor cortex or iTBS of the ipsilesional motor cortex
Broca's aphasia	No recommendation for LF rTMS of the (contralesional) right IFG
	No recommendation for HF rTMS or iTBS of the (ipsilesional) left IFG or DLPFC
Wernicke's aphasia	No recommendation for LF rTMS of the right superior temporal gyrus
Hemispatial neglect	Possible effect of cTBS of the (contralesional) left posterior parietal cortex (Level C)
	No recommendation for LF rTMS of the (contralesional) left posterior parietal cortex
	No recommendation for HF rTMS of the (ipsilesional) right posterior parietal cortex
Amyotrophic lateral sclerosis	No recommendation for cTBS or HF rTMS of M1
Multiple sclerosis	No recommendation for HF rTMS of M1
Epilepsy	Possible antiepileptic effect of focal LF rTMS of the epileptic focus (Level C)
	No recommendation for non-focal LF rTMS at the vertex
Disorders of consciousness	No recommendation for HF rTMS of DLPFC or M1
Alzheimer's disease	No recommendation for HF rTMS of DLPFC
Tinnitus	Possible effect of single sessions of "burst" or LF rTMS of the auditory cortex contralateral to tinnitus (Level C)
	Possible effect of repeated sessions of LF rTMS of the left (or contralateral to tinnitus) TPC (Level C)
	No recommendation for HF rTMS or cTBS of the auditory cortex
	No recommendation for HF rTMS of the left DLPFC combined with LF rTMS of both the right and left TPC
Depression	Definite antidepressant effect of HF rTMS of the left DLPFC (Level A)
	Probable antidepressant effect of LF rTMS of the right DLPFC (Level B) and probably no differential antidepressant effect between right LF rTMS and left HF rTMS (Level B)
	No recommendation for bilateral rTMS combining HF rTMS of the left DLPFC and LF rTMS of the right DLPFC
	Definite antidepressant effect of rTMS of DLPFC in unipolar depression (Level A), but no recommendation for bipolar depression
	Antidepressant effect of rTMS of DLPFC is probably additive to the efficacy of antidepressant drugs (Level B) and possibly potentiating (Level C)
	No recommendation for the overall respective antidepressant efficacy of rTMS of DLPFC compared to ECT
Anxiety disorders	Possible effect of HF rTMS of the right DLPFC in PTSD (Level C)
	No recommendation for LF rTMS of the right DLPFC in panic disorders
Obsessive compulsive disorder	No recommendation for HF or LF rTMS of the right or left DLPFC
	No recommendation for LF rTMS of SMA
Auditory hallucinations	Possible effect of LF rTMS of the left TPC (Level C)
	No recommendation for HF rTMS or cTBS of the left TPC
Negative symptom of schizophrenia	Probable effect of HF rTMS of the left DLPFC (Level B)
	No recommendation for bilateral HF rTMS of DLPFC and LF rTMS of the right DLPFC
Addiction and craving	Possible effect of HF rTMS of the left DLPFC on cigarette craving and consumption (Level C)
	No recommendation for HF rTMS of the right or left DLPFC for food or alcohol craving
Conversion	No recommendation for LF or HF rTMS of M1 or delivered at the vertex, using a focal or a non-focal coil

Clinical Neurophysiology xxx (2014) xxx–xxx

Contents lists available at ScienceDirect

Clinical Neurophysiology

journal homepage: www.elsevier.com/locate/clinph

Guidelines

Evidence-based guidelines on the therapeutic use of repetitive transcranial magnetic stimulation (rTMS)

Jean-Pascal Lefaucheur [a,b,*], Nathalie André-Obadia [c,d], Andrea Antal [e], Samar S. Ayache [a,b], Chris Baeken [f,g], David H. Benninger [h], Roberto M. Cantello [i], Massimo Cincotta [j], Mamede de Carvalho [k], Dirk De Ridder [l,m], Hervé Devanne [n,o], Vincenzo Di Lazzaro [p], Saša R. Filipović [q], Friedhelm C. Hummel [r], Satu K. Jääskeläinen [s], Vasilios K. Kimiskidis [t], Giacomo Koch [u], Berthold Langguth [v], Thomas Nyffeler [w], Antonio Oliviero [x], Frank Padberg [y], Emmanuel Poulet [z,aa], Simone Rossi [ab], Paolo Maria Rossini [ac,ad], John C. Rothwell [ae], Carlos Schönfeldt-Lecuona [af], Hartwig R. Siebner [ag,ah], Christina W. Slotema [ai], Charlotte J. Stagg [aj], Josep Valls-Sole [ak], Ulf Ziemann [al], Walter Paulus [e,1], Luis Garcia-Larrea [l,am,1]

- 2014 grade A de preuve
- Analgésie HF rTMS M1 controlatéral à douleur
- Dépression HF rTMS CPFDL gauche (29 études, n=1371)

- 2014 grade B de preuve
- Dépression LF rTMS CPFDL droit (8 études , n=263)
- Potentialisation antidépresseur médicamenteux LF rTMS CPFDL
- Symptômes négatifs schizophrénie HF rTMS CPFDL gauche

rTMS: evidence-based guidelines 2020

Clinical Neurophysiology 131 (2020) 474–528

Contents lists available at ScienceDirect

Clinical Neurophysiology

journal homepage: www.elsevier.com/locate/clinph

Evidence-based guidelines on the therapeutic use of repetitive transcranial magnetic stimulation (rTMS): An update (2014–2018)

Jean-Pascal Lefaucheur [a,b,*], André Aleman [c], Chris Baeken [d,e,f], David H. Benninger [g], Jérôme Brunelin [h], Vincenzo Di Lazzaro [i], Saša R. Filipović [j], Christian Grefkes [k,l], Alkomiet Hasan [m], Friedhelm C. Hummel [n,o,p], Satu K. Jääskeläinen [q], Berthold Langguth [r], Letizia Leocani [s], Alain Londero [t], Raffaele Nardone [u,v,w], Jean-Paul Nguyen [x,y], Thomas Nyffeler [z,aa,ab], Albino J. Oliveira-Maia [ac,ad,ae], Antonio Oliviero [af], Frank Padberg [m], Ulrich Palm [m,ag], Walter Paulus [ah], Emmanuel Poulet [h,ai], Angelo Quartarone [aj], d [ak], Irena Rektorová [al,am], Simone Rossi [an], Hanna Sahlsten [ao], Martin Schecklmann [r], ely [ap], Ulf Ziemann [aq]

Neuropathic pain	Definite analgesic efficacy of HF-rTMS of M1 contralateral to pain side (Level A), while LF-rTMS is probably ineffective (Level B)
CRPS type I	Possible analgesic efficacy of HF-rTMS of M1 contralateral to pain side (Level C)
Fibromyalgia	**Probable efficacy of HF-rTMS of the left M1 in improving quality of life of patients with fibromyalgia (Level B)**
Fibromyalgia	**Probable analgesic efficacy of HF-rTMS of the left DLPFC in patients with fibromyalgia (Level B)**
Parkinson's disease	**Probable efficacy of HF-rTMS of bilateral M1 regions in motor symptoms of PD patients (Level B)**
Parkinson's disease	Probable antidepressant efficacy of HF-rTMS of the left DLPFC in PD patients (Level B)
Motor stroke	**Definite efficacy of LF-rTMS of contralesional M1 in hand motor recovery at the postacute stage (Level A)**
Motor stroke	**Probable efficacy of HF-rTMS of ipsilesional M1 in hand motor recovery at the postacute stage (Level B)**
Motor stroke	**Possible efficacy of LF-rTMS of contralesional M1 in hand motor recovery at the chronic stage (Level C)**
Post-stroke aphasia	**Probable efficacy of LF-rTMS of right IFG in nonfluent aphasia recovery at the chronic stage (Level B)**
Hemispatial neglect	Possible efficacy of cTBS of the contralesional left parietal in visuospatial hemineglect recovery at the post-acute stage of stroke (Level C)
Multiple sclerosis	**Probable efficacy of iTBS of the leg area of M1 contralateral to the most affected limb (or both M1) in lower limb spasticity (Level B)**
Epilepsy	Possible antiepileptic efficacy of LF-rTMS of the epileptic focus (Level C)
Alzheimer's disease	**Possible efficacy of multisite rTMS-COG to improve cognitive function, memory and language level of AD patients, especially at a mild/early stage of the disease (Level C)**
Tinnitus	Possible efficacy of LF rTMS of the auditory cortex of the left hemisphere (or contralateral to the affected ear) in chronic tinnitus (Level C)
Depression	Definite antidepressant efficacy of HF-rTMS of the left DLPFC in major depression using a figure-of-8 coil or a H1-coil (Level A)
Depression	**Definite antidepressant efficacy of deep HF-rTMS over the left DLPFC in major depression (Level A)**
Depression	Probable antidepressant efficacy of LF-rTMS of the right DLPFC in major depression (Level B)
Depression	**Probable antidepressant efficacy of bilateral right-sided LF-rTMS and left-sided HF-rTMS of the DLPFC in major depression (Level B)**
Depression	**Probable antidepressant efficacy of bilateral right-sided cTBS and left-sided iTBS of the DLPFC in major unipolar depression (Level B), while unilateral right-sided cTBS is possibly ineffective (Level C)**
Depression	**Possibly no differential antidepressant efficacy between: right LF-rTMS vs. left HF-rTMS, bilateral vs. unilateral rTMS of the DLPFC, and rTMS performed alone vs. combined with antidepressants (Level C)**
Post-traumatic stress disorder	**Probable efficacy of HF-rTMS of the right DLPFC in PTSD (Level B)**
Obsessive compulsive disorder	**Possible efficacy of LF-rTMS of the right DLPFC in OCD (Level C)**
Schizophrenia:auditory hallucinations	Possible efficacy of LF-rTMS of the left TPC in auditory hallucinations in schizophrenia (Level C)
Schizophrenia: negative symptoms	**Possible efficacy of HF-rTMS of the left DLPFC on negative symptoms of schizophrenia (Level C)**
Addiction and craving	Possible efficacy of HF-rTMS of the left DLPFC on cigarette craving and consumption (Level C)

2020 grade A:
douleur neuropathique HF-rTMS M1
AVC moteur LF-rTMS M1
Dépression HF-rTMS lDLPFC deep, 8 ou H1 coil
2020 grade B:
Fibromyalgie, parkinson (moteur, dépression), AVC moteur et aphasie, SEP
Dépression LF-rTMS rDLPFC, bilatéral LF r + HF l, bilatéral cTBS r+ iTBS l
TSPT HF-rTMS rDLPFC

exemple de l'acceleration des connaissances: Une étude qui capte l'attention

- N=120
- 3 groupes (n=40): rTMS, bzd, TCC
- PSG, PSQI, biologie (cortisol,ACTH, hsTSH, T3l, T4l)
- Amélioration significativement supérieure:
  - NREM3 et REM
  - Indices axes HPA et HPT
  - Maintien à 3 mois

Translational Biomedical Research | Published: 25 June 2013

Efficacy of Repetitive Transcranial Magnetic Stimulation in the Treatment of Patients with Chronic Primary Insomnia

Cheng-gang Jiang, Ting Zhang, Fa-guo Yue, Ming-ling Yi & Dong Gao

Cell Biochemistry and Biophysics **67**, 169–173 (2013) | Cite this article

2459 Accesses | **36** Citations | **28** Altmetric | Metrics

Abstract

This study assessed the efficacy of repetitive transcranial magnetic stimulation (rTMS) in the treatment of patients with chronic primary insomnia. Hundred and twenty patients with chronic primary insomnia were randomly assigned to three study groups (n = 40 per group): rTMS, medication, or psychotherapy treatment (both latter as controls). The treatments proceeded for 2 weeks, after which treatment efficacies were assessed in each study group based on changes in polysomnography parameters, Pittsburgh sleep quality index, and indices of HPA and HPT axes (serum cortisol, adrenocorticotropic hormone, highly sensitive

Sleep Medicine 71 (2020) 113–121

Contents lists available at ScienceDirect

Sleep Medicine

journal homepage: www.elsevier.com/locate/sleep

Review Article

Effects of repetitive transcranial magnetic stimulation in subjects with sleep disorders

Raffaele Nardone [a, b, c, d, *], Luca Sebastianelli [e, f], Viviana Versace [e, f], Francesco Brigo [a, g], Stefan Golaszewski [h, d], Elke Pucks-Faes [h], Leopold Saltuari [e, f, h], Eugen Trinka [h, i, j]

[a] Department of Neurology, Franz Tappeiner Hospital, Merano, Italy
[b] Department of Neurology, Christian Doppler Klinik, Paracelsus Medical University, Salzburg, Austria
[c] Spinal Cord Injury and Tissue Regeneration Center, Salzburg, Austria
[d] Karl Landsteiner Institut für Neurorehabilitation und Raumfahrtneurologie, Salzburg, Austria
[e] Department of Neurorehabilitation, Hospital of Vipiteno, Vipiteno, Italy
[f] Research Unit for Neurorehabilitation South Tyrol, Bolzano, Italy
[g] Department of Neuroscience, Biomedicine and Movement Science, University of Verona, Italy
[h] Department of Neurology, Muchitsch Hospital, Zirl, Austria
[i] Centre for Cognitive Neurosciences Salzburg, Salzburg, Austria
[j] University for Medical Informatics and Health Technology, UMIT, Hall in Tirol, Austria

ARTICLE INFO ABSTRACT

Sleep Medicine 77 (2021) 226–237

Contents lists available at ScienceDirect

Sleep Medicine

journal homepage: www.elsevier.com/locate/sleep

Review Article

The effect of repetitive transcranial magnetic stimulation for insomnia: a systematic review and meta-analysis

Nianyi Sun [a, b, 1], Yu He [a, b, 1], Zhiqiang Wang [a, b], Wenchen Zou [a], Xueyong Liu [a, b, *]

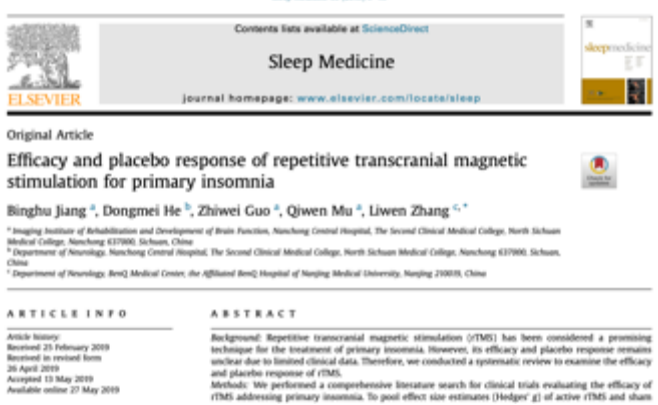
[a] Department of Rehabilitation, Shengjing Hospital of China Medical University, Shenyang, People's Republic of China
[b] Department of Physical Medicine and Rehabilitation, The Second Clinical College, China Medical University, Shenyang, People's Republic of China

ARTICLE INFO

Article history:
Received 9 April 2020
Received in revised form
3 May 2020
Accepted 12 May 2020
Available online 22 May 2020

ABSTRACT

Background: Repetitive transcranial magnetic stimulation (rTMS) might be a promising technique in treating insomnia. A comprehensive meta-analysis of the available literature is conducted to offer evidence.
Objective: To evaluate the efficacy and safety of rTMS for insomnia, either as monotherapy or as a complementary strategy.
Methods: CENTRAL, PubMed, EMBASE, PsycINFO, CINAHL, PEDro, CBM, CNKI, WANFANG, and VIP were searched from earliest record to August 2019. Randomized control trials (RCTs) published in English and



Contents lists available at ScienceDirect

Sleep Medicine

journal homepage: www.elsevier.com/locate/sleep

Original Article

Efficacy and placebo response of repetitive transcranial magnetic stimulation for primary insomnia

Binghu Jiang [a], Dongmei He [b], Zhiwei Guo [a], Qiwen Mu [a], Liwen Zhang [c, *]

[a] Imaging Institute of Rehabilitation and Development of Brain Function, Nanchong Central Hospital, The Second Clinical Medical College, North Sichuan Medical College, Nanchong 637000, Sichuan, China
[b] Department of Neurology, Nanchong Central Hospital, The Second Clinical Medical College, North Sichuan Medical College, Nanchong 637000, Sichuan, China
[c] Department of Neurology, BenQ Medical Center, the Affiliated BenQ Hospital of Nanjing Medical University, Nanjing 210019, China

ARTICLE INFO

Article history:
Received 25 February 2019
Received in revised form
26 April 2019
Accepted 13 May 2019
Available online 27 May 2019

ABSTRACT

Background: Repetitive transcranial magnetic stimulation (rTMS) has been considered a promising technique for the treatment of primary insomnia. However, its efficacy and placebo response remains unclear due to limited clinical data. Therefore, we conducted a systematic review to examine the efficacy and placebo response of rTMS.
Methods: We performed a comprehensive literature search for clinical trials evaluating the efficacy of rTMS addressing primary insomnia. To pool effect size estimates (Hedges' g) of active rTMS and sham

3 revues importantes : Jiang (2019), Nardone (2020), Sun (2020)

MAIS 21 des 28 études sont publiées en ……chinois

Sun N.
une méthodologie très rigoureuse

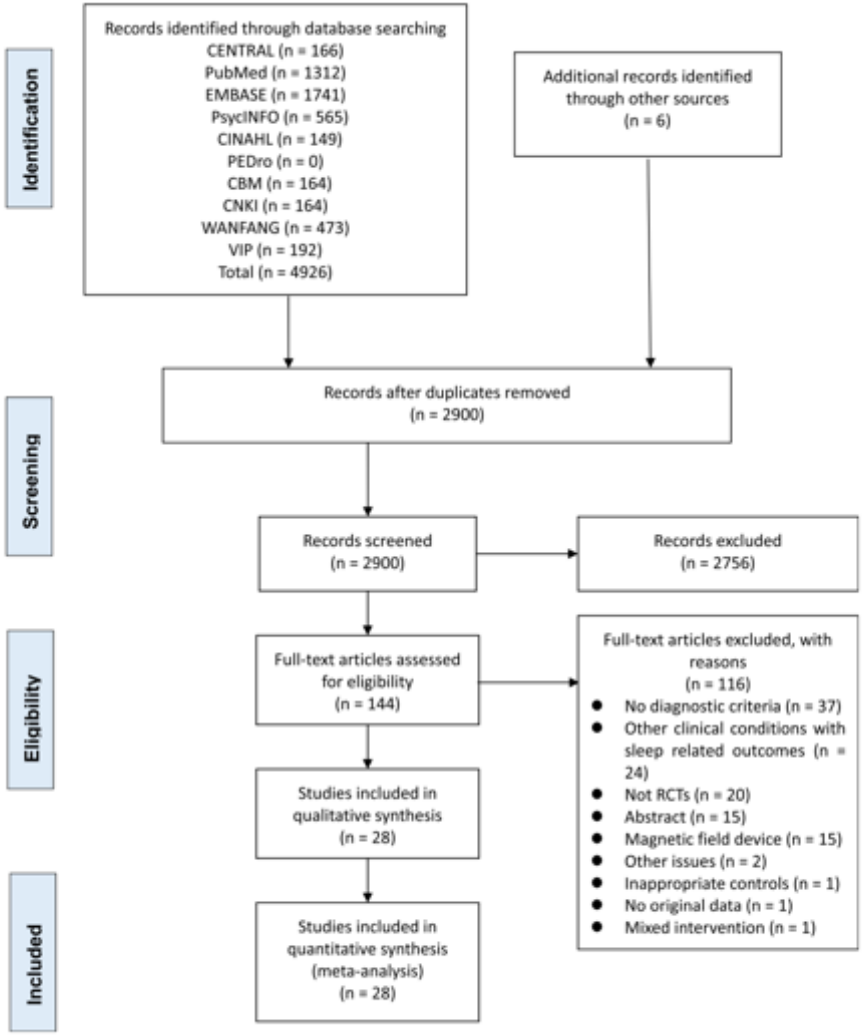


Fig. 1. Flowchart of the study selection procedure.

28 études, n=2357 , PSQI +PSG
3 conditions: rTMS vs sham rTMS, rTMS comme adjuvant, rTMS vs autre traitement

						(generalized anxiety disorder)			
Jiang 2013 [58]	135	135	44.44	47.81	DSM-IV	primary	rTMS	Medication; Psychotherapy	PSQI (total score), PSG
Zhang 2018 [59]	78	75	14.1	50.56	DSM-V	primary	rTMS + Acupuncture	Sham rTMS + Acupuncture	PSQI (total score), Insomnia Severity Index (ISI), sleeping diary and actigraphy
Bao 2018 [60]	80	80	0	51.26	CCMD-3	comorbid (menopause and depression)	rTMS + Medication	Medication	PSQI (total score)
Chen 2016 [61]	84	84	58.33	40.75	CCMD-3	primary	rTMS + Medication	Medication	PSQI (total score), PSG
Chen 2017 [62]	120	120	40	50.7	DSM-V	primary	rTMS	Medication	PSQI (total score, seven subscales)
Dong 2018 [63]	100	100	45	56.08	CCMD-3	comorbid (stroke)	rTMS + Music	Music	PSQI (total score)
Feng 2017 [64]	80	75	32.5	44.56	ICD-10	primary	rTMS	Sham rTMS	PSQI (total score, seven subscales)
Hu 2018 [65]	120	120	54.17	37.4	CCMD-3	comorbid (anxiety)	rTMS + Medication	Medication	PSQI (seven subscales PSG
Hu 2019 [66]	90	80	44.44	70.39	DSM-V	primary	rTMS	Sham rTMS	PSQI (total score, seven subscales), sleeping diary
Huang 2014 [67]	150	150	30.67	45.85	DSM-IV	primary	rTMS	Sham rTMS	PSQI (total score)
Liang 2012 [68]	48	48	85.42	24.3	CCMD-3	primary	rTMS + conventional treatment	Sham rTMS + conventional treatment	PSG
Lin 2015 [69]	90	90	46.67	43.28	DSM-IV	primary	rTMS	Medication	PSQI (total score)
Liu C 2016 [70]	60	60	46.67	56.3	DSM-IV	primary	rTMS + Medication	Sham rTMS + Medication	PSQI (total score), PSG
Liu 2018 [71]	90	90	53.33	35.3	ICD-10	comorbid (drug-dependency)	rTMS	Sham rTMS	PSQI (total score), PSG
Liu H 2016 [72]	62	62	53.23	40.11	CCMD-3	primary	rTMS + CBT	Sham rTMS + CBT	PSQI (total score)
Ma 2019 [73]	108	108	58.33	72.96	DSM-V	comorbid (depression)	rTMS + Medication	Medication	PSQI (total score)
Mai 2016 [74]	60	60	48.33	42.57	ICD-10	primary	rTMS	Sham rTMS	PSQI (total score), PSG
Meng 2017 [75]	90	90	51.11	N/A	ICD-10	primary	rTMS	Medication; Sham rTMS	PSQI (total score, seven subscales)
Shan 2018 [76]	90	90	64.44	59.02	CCMD-3	primary	rTMS + Medication; rTMS	medication	PSQI (seven subscales
Shen 2018 [77]	98	85	42.86	41	ICD-10	primary	rTMS	Sham rTMS	PSQI (total score), PSG
Wang 2016 [78]	50	50	46	51	ICD10	primary	rTMS + Medication	Medication	PSG
Yin 2018 [79]	120	120	58.33	47.35	CCMD	primary	rTMS + Medication	Medication	PSQI (total score)
Yu 2018 [80]	80	75	38.67	66.82	DSM-IV	primary	rTMS + Medication	Sham rTMS + Medication	PSQI (total score), PSG
Yu 2017 [81]	60	55	30.91	45.36	DSM-IV	primary	rTMS + Medication	Sham rTMS + Medication	PSQI (total score), PSG
Yuan 2018 [82]	60	60	43.33	52.68	ICD-10	primary	rTMS	Sham rTMS	PSQI (total score)
Zhang 2016 [83]	58	58	60.34	50.59	CCMD-3 / DSM-IV	comorbid (anxiety)	rTMS	Medication	PSG
Zhou 2014 [84]	60	60	43.33	43.1	CCMD-3	primary	rTMS	Medication	PSQI (total score), PSG

Table 2
The characteristics of stimulation parameters.

Author, year, reference	rTMS site	Intensity	Frequency (Hz)	Pulses per session	Total session	Treatment duration	Sham rTMS
Huang 2018 [57]	right posterior parietal cortex	90%RMT	1 Hz	1500	10	10 days	Inactive coil and s
Jiang 2013a, Jiang 2013b [58]	RDLPFC	80%MT	1 Hz	1800	14	2 weeks	–
Zhang 2018 [59]	left prefrontal cortex	100%RMT	1 Hz	1200	12	4 weeks	Sham coil
Bao 2018 [60]	LDLPFC	100%MT	10 Hz	N/A	20	4 weeks	–
Chen 2016 [61]	right prefrontal cortex	80%RMT	1 Hz	1800–2100	14	2 weeks	–
Chen 2017 [62]	RDLPFC	80%MT	1 Hz	N/A	10	12 days	–
Dong 2018 [63]	RDLPFC	80%RMT	1 Hz	N/A	20	20 days	–
Feng 2017 [64]	RDLPFC	80%RMT	1 Hz	1200	10	10 days	90° tilted coil
Hu 2018 [65]	left prefrontal cortex	80–100%MT	10–20 Hz	1500	30	6 weeks	–
Hu 2019a [66]	RDLPFC	80%RMT	1 Hz	1500	20	4 weeks	90° tilted coil
Hu 2019b [66]	raphe nuclei	80%RMT	1 Hz	1500	20	4 weeks	90° tilted coil
Huang 2014a [67]	LDLPFC	0.2–0.8 T	1 Hz	N/A	10	10 days	Inactive coil and s
Huang 2014b [67]	RDLPFC	0.2–0.8 T	1 Hz	N/A	10	10 days	Inactive coil and s
Huang 2014c [67]	left middle temporal cortex	0.2–0.8 T	1 Hz	N/A	10	10 days	Inactive coil and s
Huang 2014d [67]	left prefrontal cortex	0.2–0.8 T	1 Hz	N/A	10	10 days	Inactive coil and s
Liang 2012 [68]	prefrontal cortex	80%RMT	1 Hz	2400	15	3 weeks	180° tilted coil
Lin 2015a [69]	RDLPFC	50%MT	0.5 Hz	N/A	10次	10 days	–
Lin 2015b [69]	RDLPFC	50%MT	0.5 Hz	N/A	20次	10 days	–
Liu C 2016 [70]	RDLPFC	80%RMT	1 Hz	1600	28	4 weeks	180° tilted coil
Liu 2018 [71]	RDLPFC	80%–100%RMT	1 Hz	N/A	30	30 days	180° tilted coil
Liu H 2016 [72]	RDLPFC	0.2–0.8 T	1 Hz	1800	14	2 weeks	Inactive coil and s
Ma 2019 [73]	RDLPFC	80%RMT	1 Hz	N/A	30	6 weeks	–
Mai 2016 [74]	RDLPFC	100%MT	1 Hz	1500	14	2 weeks	Inactive coil and s
Meng 2017a [75]	middle and right prefrontal cortex	N/A	1 Hz	N/A	20	4 weeks	–
Meng 2017b [75]	middle and right prefrontal cortex	N/A	1 Hz	N/A	20	4 weeks	Sham coil
Shan 2018a [76]	right posterior parietal cortex	110%MT	1 Hz	1500	20	20 days	–
Shan 2018b [76]	right posterior parietal cortex	110%MT	1 Hz	1500	20	20 days	–
Shen 2018 [77]	RDLPFC	80–130%MT	0.5–1 Hz	N/A	20	4 weeks	low intensity
Wang 2016 [78]	BDLPFC	right 80 MT, left 50%MT	right 1 Hz, left 5 Hz	right 800, left 800	15	3 weeks	–
Yin 2018 [79]	RDLPFC	N/A	1 Hz	N/A	20	4 weeks	–
Yu 2018 [80]	RDLPFC	90%MT	1 Hz	1100	20	4 weeks	90° tilted coil
Yu 2017 [81]	RDLPFC	90%MT	1 Hz	1400	20	4 weeks	90° tilted coil
Yuan 2018 [82]	DLPFC	90%–110%MT	1 Hz	N/A	20	4 weeks	Sham coil
Zhang 2016 [83]	RDLPFC	80%MT	<1 Hz	N/A	7	7 days	–
Zhou 2014 [84]	RDLPFC	80%RMT	1 Hz	1800	14	14 days	–

Abbreviations: rTMS: repetitive transcranial magnetic stimulation; MT: motor threshold; RMT: resting motor threshold; T: tesla; RDLPFC, right dorsolateral prefrontal c
LDLPFC, left dorsolateral prefrontal cortex; BDLPFC, bilateral dorsolateral prefrontal cortex; –: non-sham rTMS controlled; N/A: not applicable.

reduced S1 and ATA, and improved S2 and REMS compared with TST (P = 0.0002 for interaction) and S1 (P = 0.04 for interactio

rTMS vs sham rTMS

Table 4
Meta-analysis of PSG of rTMS vs sham rTMS.

Domain	n	No. of participants	SMD [95%CI]	I^2 (%)	P Value
TST	2	145	0.71 [−0.03, 1.45]	78	0.06
SL	3	235	−1.49 [−3.23, 0.24]	97	0.09
SE	2	145	1.05 [−0.74, 2.83]	96	0.25
ATA	3	235	−1.17 [−2.28, −0.05]	93	0.04
AT	2	150	−0.06 [−0.38, 0.26]	0	0.72
S1	2	145	−3.01 [−9.11, 3.09]	99	0.33
S2	2	145	−0.79 [−3.26, 1.69]	98	0.53
S3	2	145	3.01 [0.53, 5.49]	96	0.02
REMS	2	145	1.11 [0.76, 1.47]	0	<0.00001

Abbreviations: n, No. of trials; SMD, standardized mean differences; CI, confidence interval; TST, total sleep time; SL, sleep latency; SE, sleep efficiency; ATA, all time awake; AT, awaking times; S1, percentage of sleep stage 1 in total sleep time; S2, percentage of sleep stage 2 in total sleep time; S3, percentage of sleep stage 3 in total sleep time; REMS, percentage of rapid eye movement sleep in total sleep time.

Study or Subgroup	Experimental Mean	Experimental SD	Experimental Total	Control Mean	Control SD	Control Total	Weight	Std. Mean Difference IV, Random, 95% CI
Huang2018	7.06	2.75	18	11.44	4.13	18	8.0%	-1.22 [-1.94, -0.50]
Feng2017	8.59	2.04	41	11.4	2.95	34	8.5%	-1.12 [-1.61, -0.63]
Hu2019a	6.75	1.55	28	14.54	1.56	13	6.5%	-4.92 [-6.22, -3.62]
Hu2019b	9	1.1	26	14.54	1.56	13	6.8%	-4.28 [-5.48, -3.08]
Huang2014a	9.63	2.06	30	13.7	2.34	8	7.6%	-1.88 [-2.78, -0.98]
Huang2014b	9.7	2.53	30	13.7	2.34	8	7.7%	-1.57 [-2.43, -0.71]
Huang2014c	11.83	2.26	30	13.7	2.34	7	7.7%	-0.80 [-1.65, 0.04]
Huang2014d	12.2	3.07	30	13.7	2.34	7	7.8%	-0.50 [-1.33, 0.34]
Liu2018	5.3	1.8	45	10.9	2.3	45	8.3%	-2.69 [-3.26, -2.11]
Mai2016	5.6	2.9	30	9.3	1.35	30	8.3%	-1.61 [-2.20, -1.03]
Meng2017b	9.24	0.74	14	15.23	1.23	31	6.5%	-5.33 [-6.64, -4.01]
Shen2018	10.12	2.15	46	16.45	2.08	39	8.2%	-2.96 [-3.59, -2.34]
Yuan2018	9.53	1.31	30	13.93	2.27	30	8.1%	-2.34 [-3.01, -1.68]
Total (95% CI)			**398**			**283**	**100.0%**	**-2.31 [-2.95, -1.66]**

Heterogeneity: Tau² = 1.22; Chi² = 113.38, df = 12 (P < 0.00001); I² = 89%
Test for overall effect: Z = 7.01 (P < 0.00001)

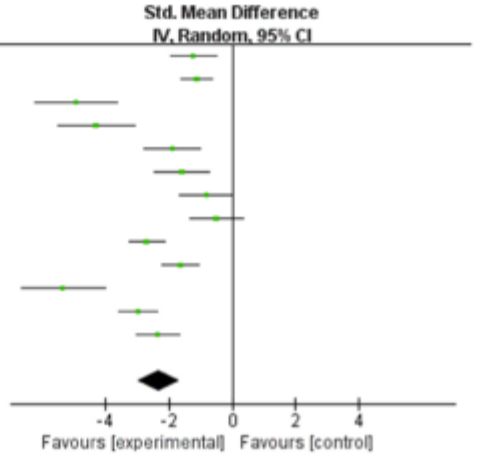


Fig. 2. A forest plot for meta-analysis of PSQI total score of rTMS vs sham rTMS.

Table 3
Meta-analysis of scores of seven subscales of the PSQI of rTMS vs sham rTMS.

Domain	n	No. of participants	SMD [95%CI]	I^2 (%)	P Value
Sleep quality	4	200	−1.28 [−1.86, −0.69]	68	<0.0001
Sleep latency	4	200	−1.34 [−1.97, −0.71]	72	<0.0001
Sleep tim	4	200	−0.70 [−1.00, −0.40]	32	<0.00001
Sleep effic	4	200	−0.67 [−0.97, −0.37]	45	<0.0001
Sleep disturbance	4	200	−1.35 [−2.12, −0.59]	81	0.0005
Hypnotic using	4	200	−1.57 [−2.40, −0.74]	83	0.0002
Daytime dysfunction	4	200	−1.13 [−1.45, −0.82]	48	<0.00001

Abbreviations: n, No. of trials; SMD, standardized mean differences; CI, confidence interval.

Transparence

tDCS: evidence-based guidelines 2017

2017 grade B: fibromyalgie, dépression non-résistante (39 études, n=988), addiction alcool, drogues, nicotine

Clinical Neurophysiology 128 (2017) 56–92

Contents lists available at ScienceDirect

Clinical Neurophysiology

journal homepage: www.elsevier.com/locate/clinph

Guidelines

Evidence-based guidelines on the therapeutic use of transcranial direct current stimulation (tDCS)

Jean-Pascal Lefaucheur, Andrea Antal, Samar S. Ayache, David H. Benninger, Jérôme Brunelin, Filippo Cogiamanian, Maria Cotelli, Dirk De Ridder, Roberta Ferrucci, Berthold Langguth, Paola Marangolo, Veit Mylius, Michael A. Nitsche, Frank Padberg, Ulrich Palm, Emmanuel Poulet, Alberto Priori, Simone Rossi, Martin Schecklmann, Sven Vanneste, Ulf Ziemann, Luis Garcia-Larrea, Walter Paulus

COMPREHENSIVE REVIEW/REVUE GÉNÉRALE

A comprehensive database of published tDCS clinical trials (2005–2016)

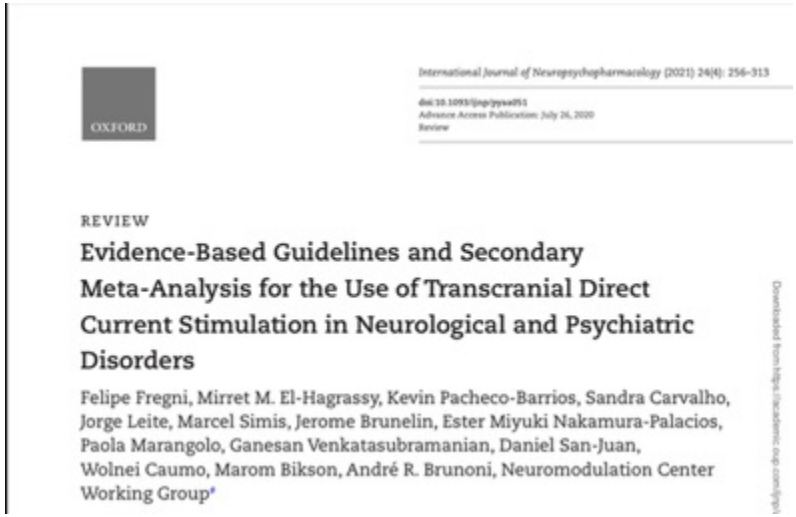
Une base de données complète des études cliniques utilisant la tDCS (2005–2016)

Jean-Pascal Lefaucheur

Chronic neuropathic pain of the lower limbs due to spinal cord lesion	Anodal tDCS of left M1 (or contralateral to pain side) is possibly effective in case of spinal cord lesion (Level C). No recommendation in case of peripheral nervous system lesion
Chronic non-neuropathic oral, facial, low back, abdominal, or pelvic pain	No recommendation for anodal tDCS of left M1 (or contralateral to pain side)
Fibromyalgia	Anodal tDCS of left M1 is probably effective (Level B)
Migraine	No recommendation for anodal tDCS of the left M1 or cathodal tDCS of V1
Postoperative pain	No recommendation for anodal tDCS of M1 or the left DLPFC
Parkinson's disease (motor symptoms)	No recommendation for anodal tDCS of the motor cortex
Parkinson's disease (cognitive symptoms)	No recommendation for anodal tDCS of the left DLPFC
Dystonia (focal or generalized)	No recommendation for anodal or cathodal tDCS of the motor cortex
Motor stroke	No recommendation for anodal tDCS of the ipsilesional motor cortex in acute, postacute, or chronic stage No recommendation for cathodal tDCS of the contralesional motor cortex in postacute stage No recommendation for bihemispheric tDCS of the motor cortex (ipsilesional anode + contralesional cathode) in chronic stage
Nonfluent poststroke aphasia	No recommendation for anodal tDCS of left Broca's area or Wernicke's area or cathodal tDCS of their right homologous region in postacute or chronic stage
Multiple sclerosis (fatigue or cognitive disorders)	No recommendation for anodal tDCS of sensory or motor cortex or the left DLPFC
Multiple sclerosis (sensory or motor symptoms)	No recommendation for anodal tDCS of M1
Epilepsy	No recommendation for cathodal tDCS of the epileptic focus or anodal tDCS of the left DLPFC
Disorders of consciousness	No recommendation for anodal tDCS of the left DLPFC
Alzheimer's disease	No recommendation for anodal tDCS of the left DLPFC or the temporoparietal cortex
Tinnitus	Anodal tDCS of the left temporoparietal cortex is probably ineffective (Level B) No recommendation for bihemispheric tDCS of the DLPFC (right anode + left cathode)
Depression	Anodal tDCS of the left DLPFC with right orbitofrontal cathode is probably effective in non-drug-resistant major depression (Level B) and probably ineffective in drug-resistant major depression (Level B) No recommendation for bihemispheric tDCS of the DLPFC (left anode + right cathode)
Schizophrenia (AVH or negative symptoms)	No recommendation for anodal tDCS of the left DLPFC with left temporoparietal or right supraorbital cathode
Addiction/craving	Bihemispheric tDCS of the DLPFC (right anode + left cathode) is probably effective in addiction/craving (alcohol, drugs, smoking) (Level B) No recommendation for anodal tDCS of the left DLPFC with right supraorbital cathode

tDCS: evidence-based guidelines 2021

2021 grade A : dépression (anodal left DLPFC)(18 études, n=976)
2021 grade B : douleur neuropathique, fibromyalgie, migraine, douleur post-opératoire, Parkinson (moteur et cognition), AVC (moteur), épilepsie, schizophrénie, TUS alcool



OXFORD

International Journal of Neuropsychopharmacology (2021) 24(4): 256–313
doi:10.1093/ijnp/pyaa051
Advance Access Publication: July 26, 2020
Review

REVIEW

Evidence-Based Guidelines and Secondary Meta-Analysis for the Use of Transcranial Direct Current Stimulation in Neurological and Psychiatric Disorders

Felipe Fregni, Mirret M. El-Hagrassy, Kevin Pacheco-Barrios, Sandra Carvalho, Jorge Leite, Marcel Simis, Jerome Brunelin, Ester Miyuki Nakamura-Palacios, Paola Marangolo, Ganesan Venkatasubramanian, Daniel San-Juan, Wolnei Caumo, Marom Bikson, André R. Brunoni, Neuromodulation Center Working Group#

Downloaded from https://academic.oup.com/ijnp/

Table 12. Summary of Recommendations on tDCS Efficacy According to Clinical Indications [a]

	Condition	Recommendation	Pooled effect sizes [a]
Pain	Neuropathic pain	Anodal M1 tDCS probably effective in reducing neuropathic pain (Level B)	−0.29 (−0.60, 0.02)
	Fibromyalgia	Anodal M1 tDCS probably effective in reducing fibromyalgia pain (Level B)	−0.62 (−1.23, −0.01)
	Migraine	Anodal M1 tDCS probably effective in reducing migraine pain (Level B)	−0.41 (−1.40, 0.59)[a]
	MPS	No recommendation	Not estimable
	Postoperative acute pain	Postoperative anodal M1 tDCS probably effective in reducing patient-controlled analgesia and pain (Level B)	−0.70 (−1.09, −0.30)
	Low back pain	No recommendation	Not estimable
PD	Motor function	Anodal motor/premotor/SMA tDCS possibly effective for motor function in PD (Level C); anodal prefrontal tDCS probably not effective for motor function in PD (Level B)	−0.38 (−0.68, −0.09)
	Cognitive function	Anodal DLPFC tDCS probably effective for cognitive function in PD (Level B)	−0.33 (−1.02, 0.35)
Chronic stroke	Motor function	Anodal tDCS of ipsilesional M1 probably effective for motor rehab in chronic stroke (Level B);	0.52 (−0.04, 1.09)
		Anodal tDCS of ipsilesional M1 to enhance robotic therapy probably not effective for motor rehab in chronic stroke (Level B);	0.23 (−0.31, 0.77)
		Cathodal tDCS of contralesional M1 probably effective for motor rehab in chronic stroke (Level B);	0.44 (−.18, 1.06)
		Bilateral tDCS of M1 probably effective for motor rehab in chronic stroke (Level B)	0.44 (0.10, 0.79)
	Aphasia	Anodal tDCS of Broca's area, its homologue, or Wernicke's area is possibly effective in chronic post–stroke aphasia rehab (Level C)	Broca's Area: 0.65 (0.29, 1.01) Not estimable
		Cathodal right frontotemporal tDCS is possibly effective in chronic post–stroke aphasia rehab (Level C)	Not estimable
		Bilateral tDCS w/ anodal stimulation of Broca's area and cathodal stimulation of its homologue is possibly effective in chronic post–stroke aphasia rehab (Level C)	
Subacute stroke	Motor function	Anodal tDCS of ipsilesional M1 probably effective for motor rehab in subacute stroke (Level B)	0.44 (−0.03, 0.91)
		Anodal tDCS of ipsilesional M1 to enhance robotic therapy is definitely not effective for motor rehab in subacute stroke (Level A)	0.01 (−0.33, 0.34)
		Cathodal tDCS of contralesional M1 probably effective for motor rehab in subacute stroke (Level B)	0.47 (0.10, 0.84)
		Cathodal tDCS of contralesional M1 to enhance robotic therapy probably not effective for motor rehab in subacute stroke (Level B)	Not estimable
		Bilateral tDCS of M1 is possibly effective for motor rehab in subacute stroke (Level C)	0.39 (−0.07, 0.86)
Epilepsy	Seizure frequency	Cathodal tDCS probably safe (no increase in seizures) and effective (decrease in seizures) in epilepsy (Level B)	−0.70 (−1.38, −0.02)
MDD	Depression	Anodal left DLPFC tDCS is definitely effective for treatment of depression in MDD (Level A)	−0.36 (−0.66, −0.06)
OCD and TS	OCD	Anodal pre–SMA tDCS is possibly effective in improving OCD symptoms (Level C)	−0.61 (−1.87, 0.64)
	TS	No recommendation	Not estimable
Schizophrenia	Auditory hallucinations and positive/negative symptoms	Anodal left prefrontal w/ cathodal left temporoparietal tDCS probably effective for reducing auditory hallucinations in schizophrenia (Level B)	−0.47 (−0.72, −0.22)
Addiction	Alcohol: craving or relapses	Right DLPFC anodal w/ left DLPFC cathodal tDCS probably effective in decreasing relapses or craving in alcohol addiction (Level B)	0.21 (−0.08, 0.49)
	Crack-cocaine	No recommendation	Not estimable
	Methamphetamine	No recommendation	Not estimable

Abbreviations: MDD, Major Depressive Disorder; MPS, Myofascial Pain Syndrome; OCD, obsessive compulsive disorder; PD, Parkinson's disease; rehab, rehabilitation; TS, Tourette syndrome.
[a] Effect sizes are based on a smaller number of studies due to data availability.

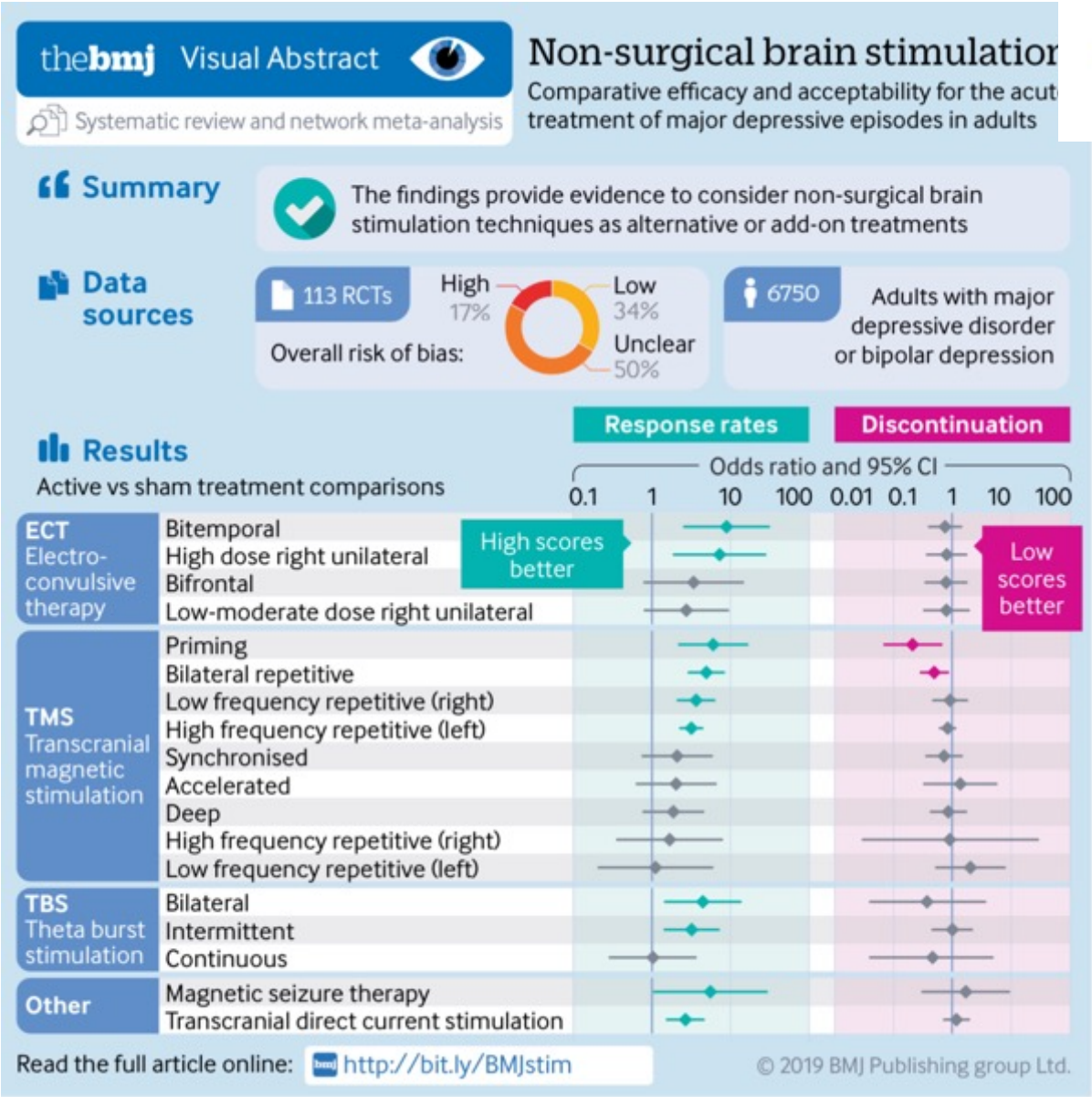
Table 1. Evidence-Based Guidelines (Brainin et al., 2004; Lefaucheur et al., 2014) (adapted from (Brainin et al., 2004))

Class I	Level A: Definitely effective or ineffective
Representative population—n ⩾ 25 of patients receiving active treatment; Data-supported, prospective, randomized, placebo-controlled clinical trials; It should include all of these listed criteria: Randomization concealment; clearly defined primary outcomes; clearly defined exclusion/inclusion criteria; adequate accounting for dropouts and crossovers w/ numbers sufficiently low to have minimal potential for bias; relevant baseline characteristics substantially equivalent among treatment groups or appropriate statistical adjustment for differences.	At least 2 convincing Class I studies or 1 convincing Class I study and at least 2 consistent, convincing Class II studies
	Level B: Probably effective or ineffective At least 2 convincing Class II studies or 1 convincing Class II study and at least 2 consistent, convincing Class III studies
Class II Smaller sample size, n<25	Level C: Possibly effective or ineffective 1 convincing Class II study or at least 2 convincing Class III studies
Randomized, placebo-controlled trials Or Lacks at least 1 of above-listed criteria (1–5)	No evidence Absence of at least 2 convincing Class III studies w/ similar results on the same type of clinical features w/ similar stimulation method
Class III All other controlled trials Class IV Uncontrolled studies; Case series; Case reports	

Abbreviations: w/, with.

Et si on reprenait les données de l'ECT?

- Heijnen 2010, 7 études, n=958, observational studies (remission rate 48% si échec ADP, 64.9% sinon)
- Pagnin 2004, ECT vs SECT, 3 études, n=266 (OR 11.083), ECT vs mdct, 16 études , n=1038 (OR 3.72) randomized studies , ECT vs mdct, 7 études , n=2275 (OR 2.84) observational studies: grade A
- UK ECT review group 2003, ECT vs SCT , 6 études, n=256 (SES -0.91 élevée), ECT vs ADP , 18 études, n= 1144 (SES -0.80 élevée), randomized studies : grade A



OPEN ACCESS

Check for updates

Comparative efficacy and acceptability of non-surgical brain stimulation for the acute treatment of major depressive episodes in adults: systematic review and network meta-analysis

Julian Mutz,[1] Vijeinika Vipulananthan,[2] Ben Carter,[3] René Hurlemann,[4] Cynthia H Y Fu,[5,6] Allan H Young[2,6]

BMJ: first published