

rTMS ALS BEHANDELMETHODE: ACHTERGRONDEN EN TOEPASSING IN DE KLINISCHE PRAKTIJK



Iris van Oostrom

Klinisch neuropsycholoog, supervisor VGCT, PhD





WAT IS rTMS?

REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION



rTMS is een niet-invasieve neurostimulatietechniek die activiteit opwekt in de hersenen door middel van een magnetische puls

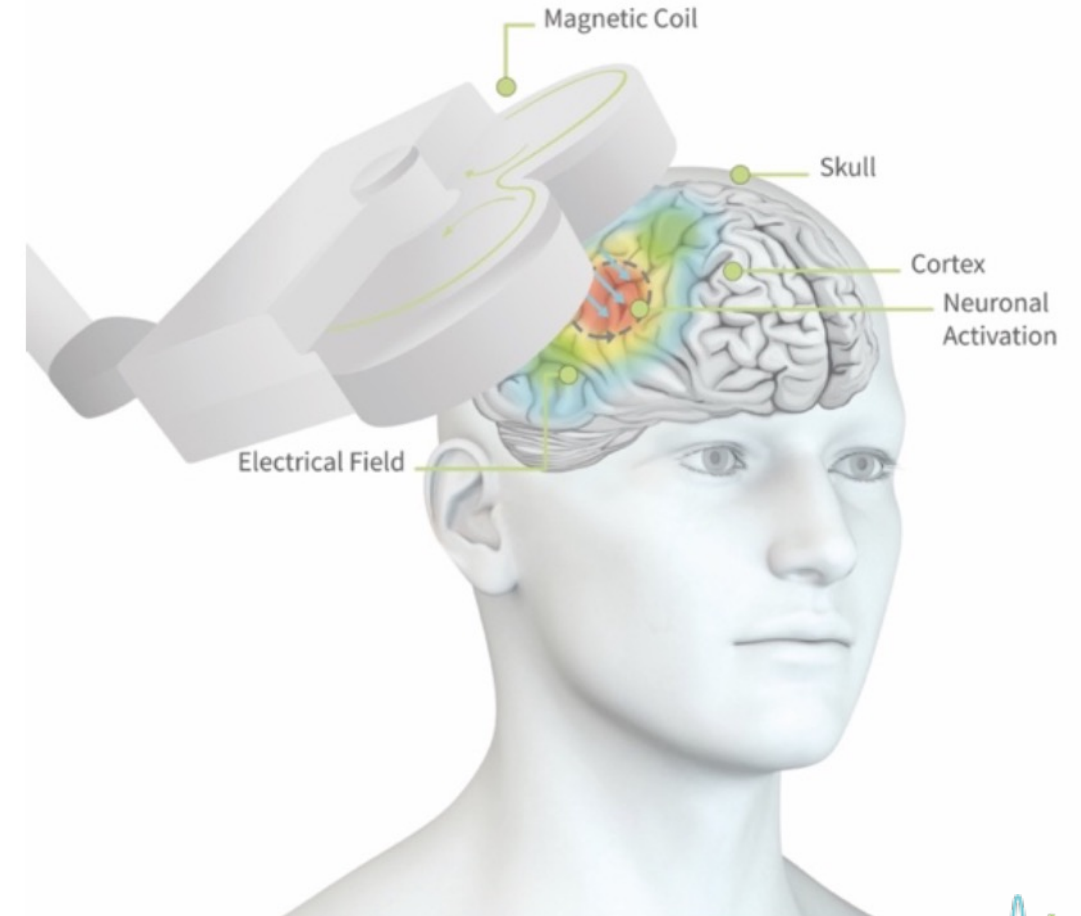
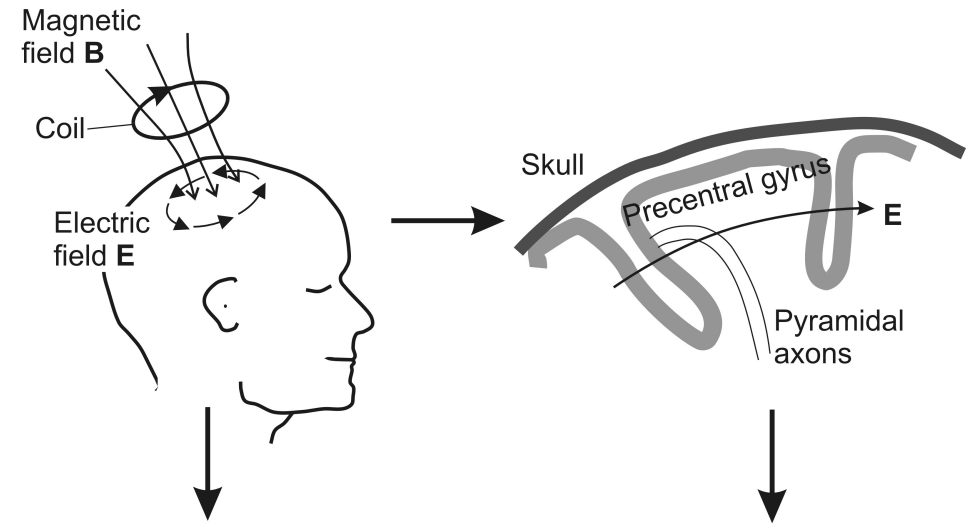
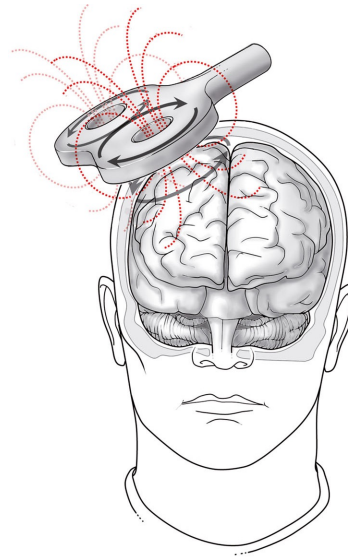


Table 2. Summary of Neurostimulation Treatment Recommendations for Major Depressive Disorder.

Neurostimulation	Overall Recommendation	Acute Efficacy
rTMS	First line (for patients who have failed at least 1 antidepressant)	Level 1
ECT	Second line	Level 1
	First line in some clinical situations (see Table 5)	
tDCS	Third line	Level 2
VNS	Third line	Level 3
DBS	Investigational	Level 3
MST	Investigational	Level 3

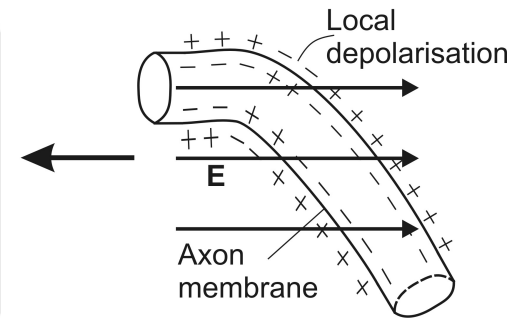
DBS, deep brain stimulation; ECT, electroconvulsive therapy; MST, magnetic seizure therapy; rTMS, repetitive transcranial magnetic stimulation; tDCS, transcranial direct current stimulation; VNS, vagus nerve stimulation.

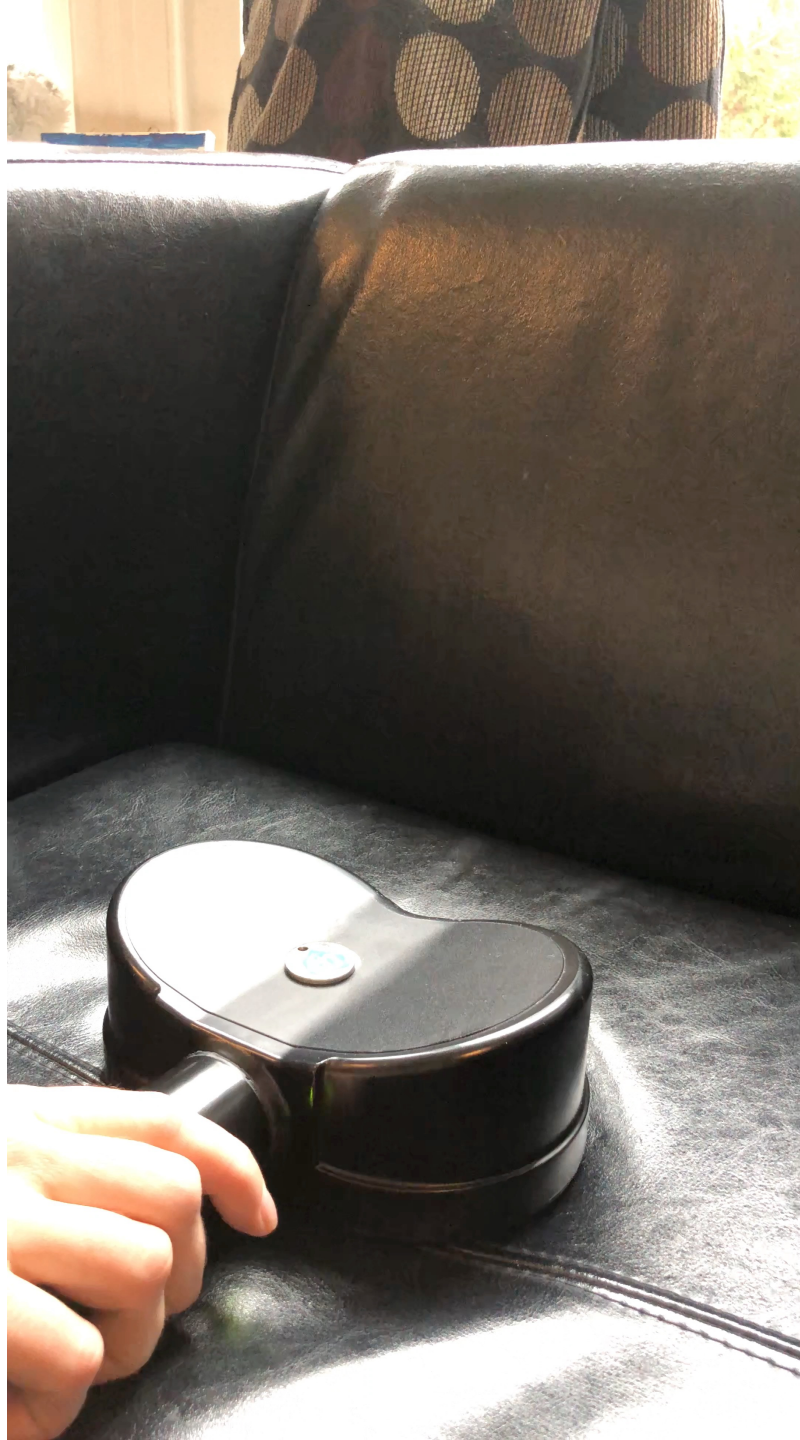
PRINCIPE: ELECTROMAGNETISCHE INDUCTIE



- Kortdurende, sterke stroom door een externe spoel
- Genereert een magnetisch veld: puls
- Puls veroorzaakt depolarisatie van de axonen in het verlengde van het magnetische veld = de cortex

– evoked neuronal activity (EEG)
– changes in blood flow and metabolism (PET, fMRI)
– muscle twitches (EMG) and changes in behavior





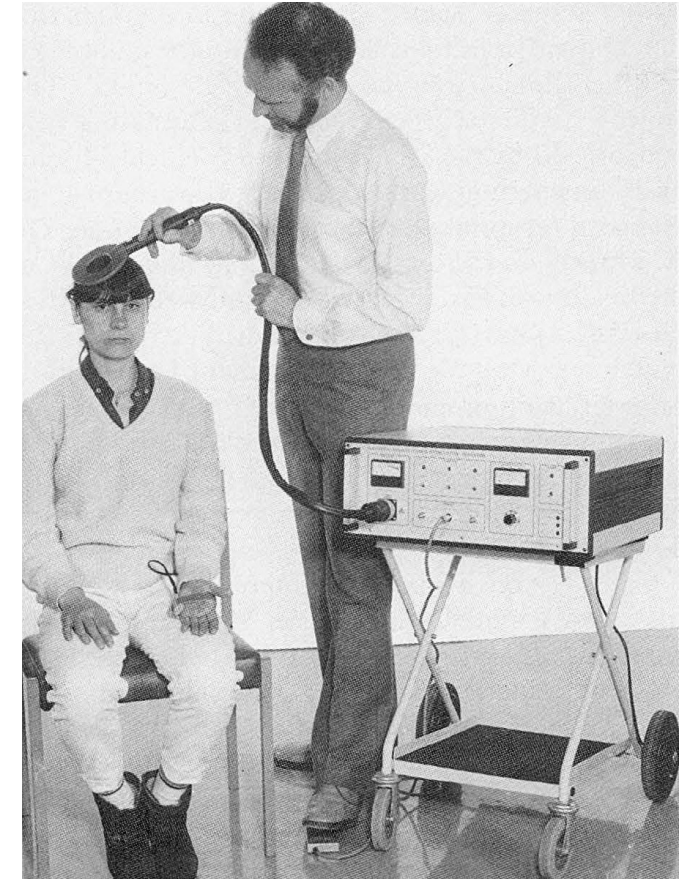
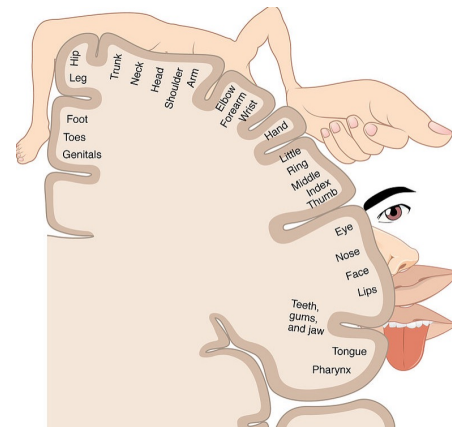
GESCHIEDENIS

Anthony Barker 1985:

- Eerste succesvolle magnetische stimulatie van de *motor* cortex
- Ontwikkeling TMS stimulator

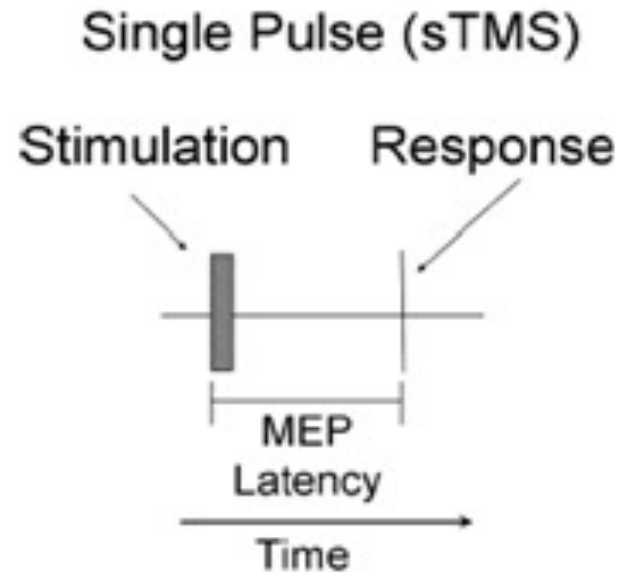
Onderzoeksinstrument in cognitive neuroscience:

- Studies over motoriek, taal, aandacht, geheugen, visuele perceptie
- Functielocalisatie (Cohen et al., 1997)



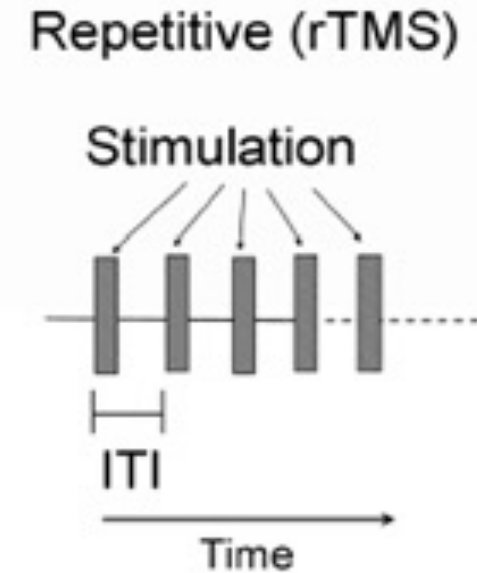
Barker (1991)

VAN sTMS NAAR rTMS



Voordelen:

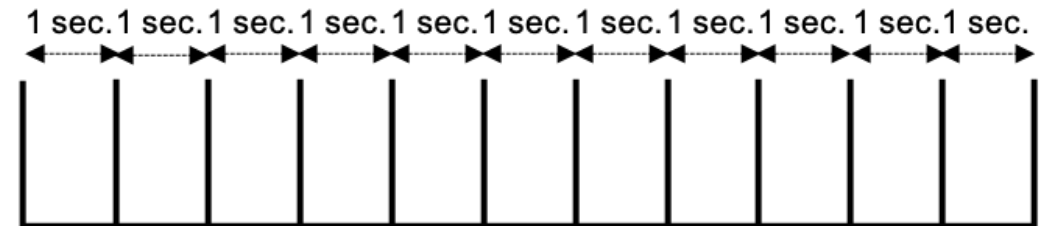
- cumulatieve excitatoire of inhibitoire effecten
- langer durend effect
- therapeutische mogelijkheden



STIMULATIE FREQUENTIE



- Laagfrequente rTMS (< 1 Hz):
onderdrukt corticale excitatie



- Hoog frequente rTMS (>5 Hz):
faciliteert corticale excitatie

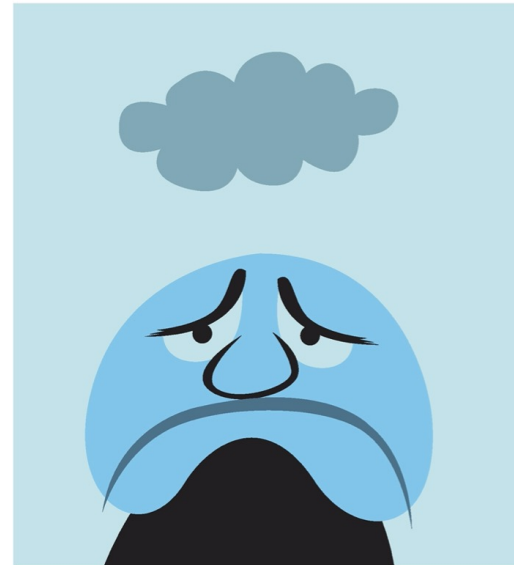


(Pascual-Léone et al., 1994; Chen et al., 1997)

rTMS BIJ DEPRESSIE

“Several researchers using TMS as an investigative tool in neurology noted incidentally that a number of subjects reported mood changes after TMS stimulation”

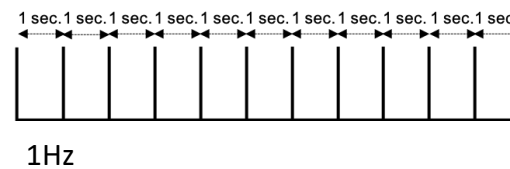
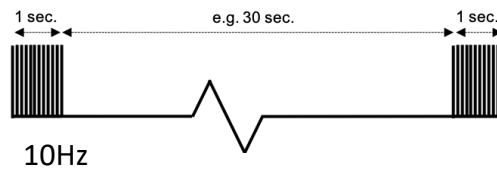
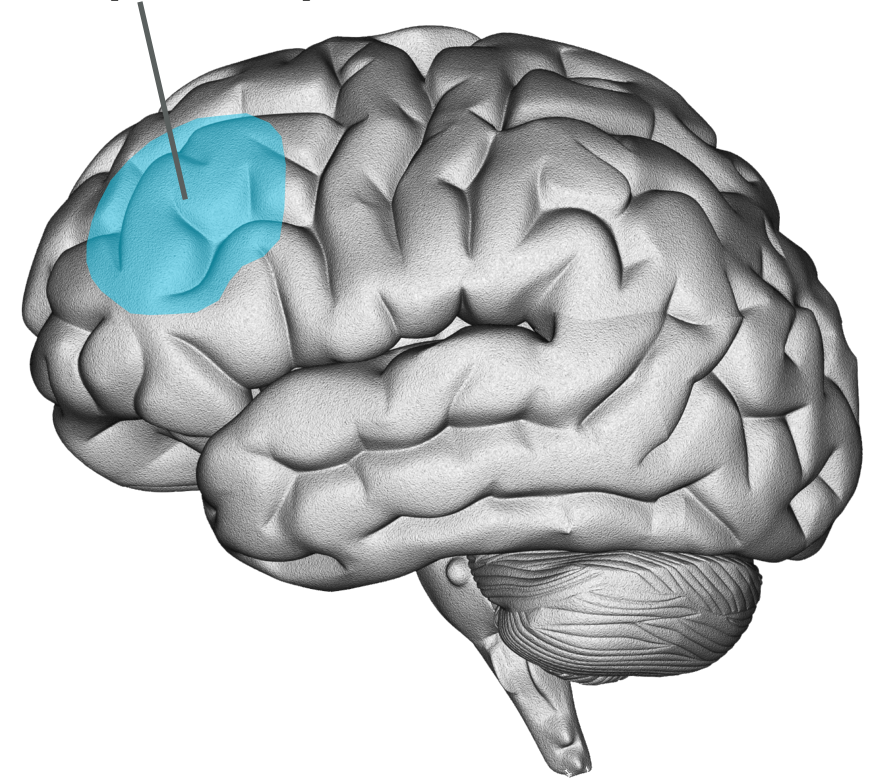
Bickford et al., 1987



RATIONALE 10Hz links en 1Hz rechts

Dorsolateral Prefrontal Cortex (DLPFC)

- Linkszijdige lesie: hogere incidentie van depressie (George et al., 1994)
 - Hypometabolisme links meer dan rechts (Baxter et al., 1989)
- 10Hz linker DLPFC/ 1Hz rechter DLPFC





BEHANDELEFFECTEN

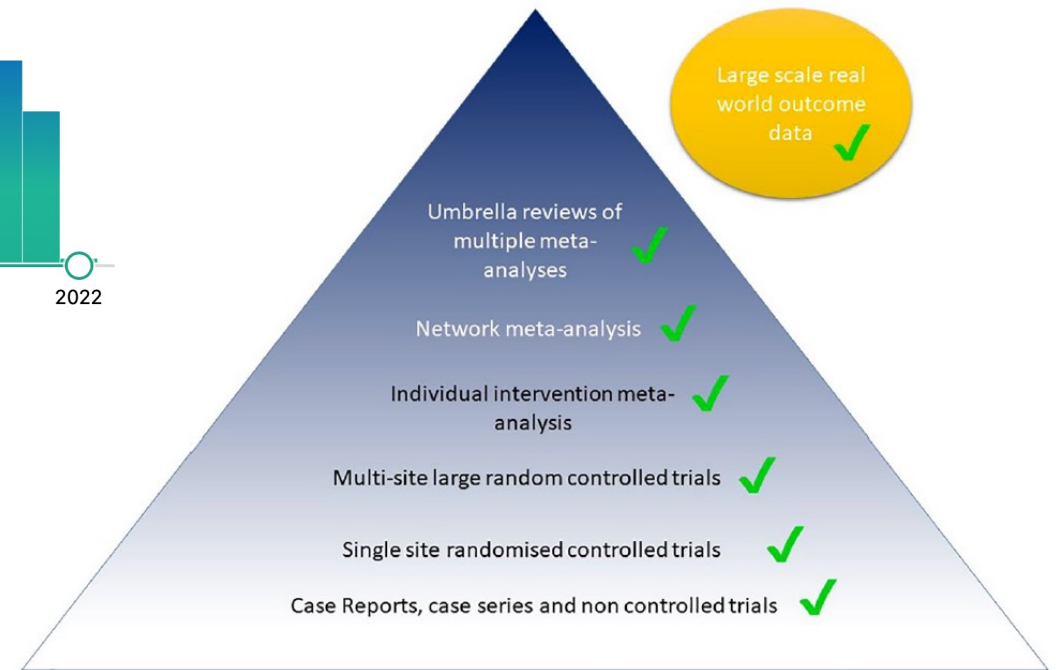
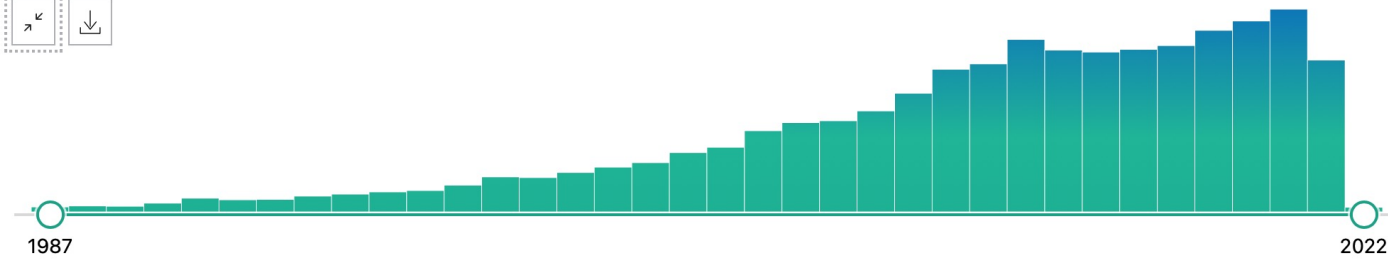
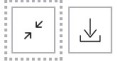
rTMS IN ONDERZOEK

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Sorted by: Most recent

RESULTS BY YEAR

19,896 results



Fitzgerald et al 2021

META-ANALYSE EFFECT rTMS

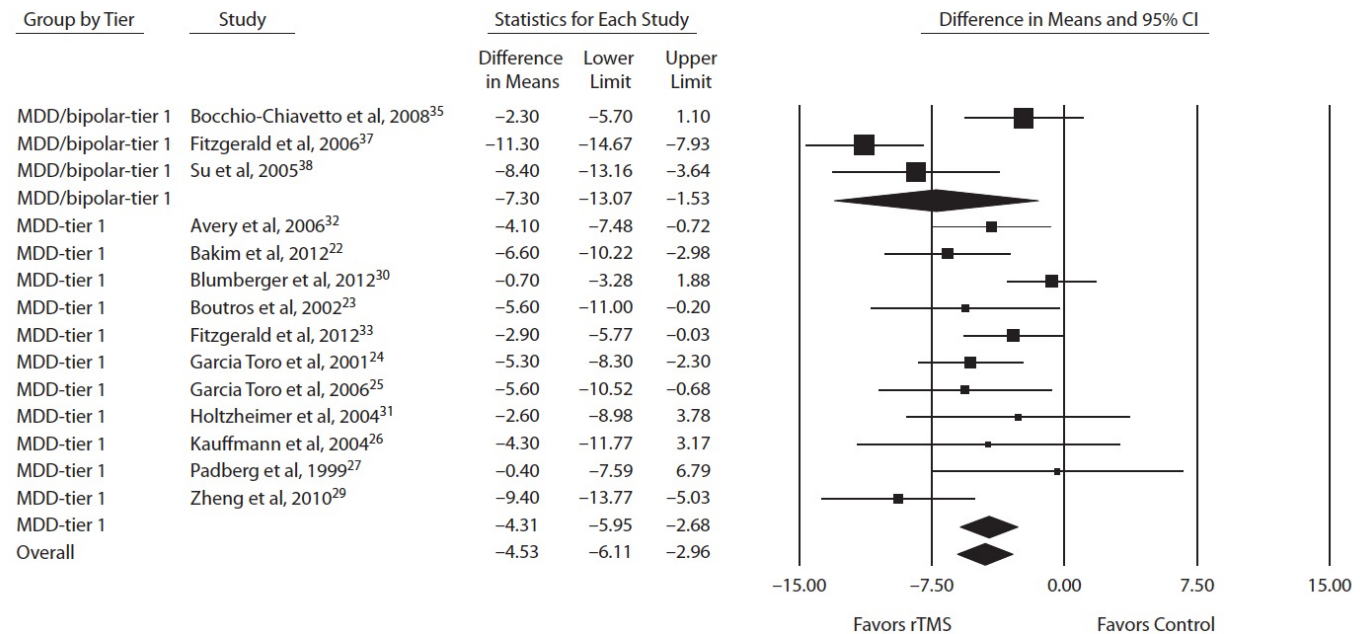
Repetitive Transcranial Magnetic Stimulation for Treatment-Resistant Depression: A Systematic Review and Meta-Analysis

Bradley N. Gaynes, MD, MPH;
 Stacey W. Lloyd, MPH; Linda Lux, MPA;
 Gerald Gartlehner, MD, MPH; Richard A. Hansen, PhD
 Shannon Brode, MPH; Daniel E. Jonas, MD, MPH;
 Tammeka Swinson Evans, MOP;
 Meera Viswanathan, PhD; and
 Kathleen N. Lohr, PhD, MPhil, MA

Conclusions: For MDD patients with 2 or more antidepressant treatment failures, rTMS is a reasonable, effective consideration.

J Clin Psychiatry 2014;75(5):477–489

Figure 2. Mean Difference Meta-Analysis of Changes in Depressive Severity Comparing rTMS and Sham: Tier 1 Trials^a



^aRandom-effects meta-analysis, $I^2 = 65\%$.

Abbreviations: MDD = major depressive disorder, rTMS = repetitive transcranial magnetic stimulation.

EFFECT IN KLINISCHE PRAKTIJK

Journal of Affective Disorders 277 (2020) 65–74



Contents lists available at ScienceDirect

Journal of Affective Disorders

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

2020

Clinical outcomes in a large registry of patients with major depressive disorder treated with Transcranial Magnetic Stimulation

Harold A. Sackeim^{a,*}, Scott T. Aaronson^b, Linda L. Carpenter^c, Todd M. Hutton^d, Miriam Mina^e, Kenneth Pages^f, Sarah Verdoliva^g, W. Scott West^h

PHQ-9 treatment outcomes in the intent-to-treat and completer samples.

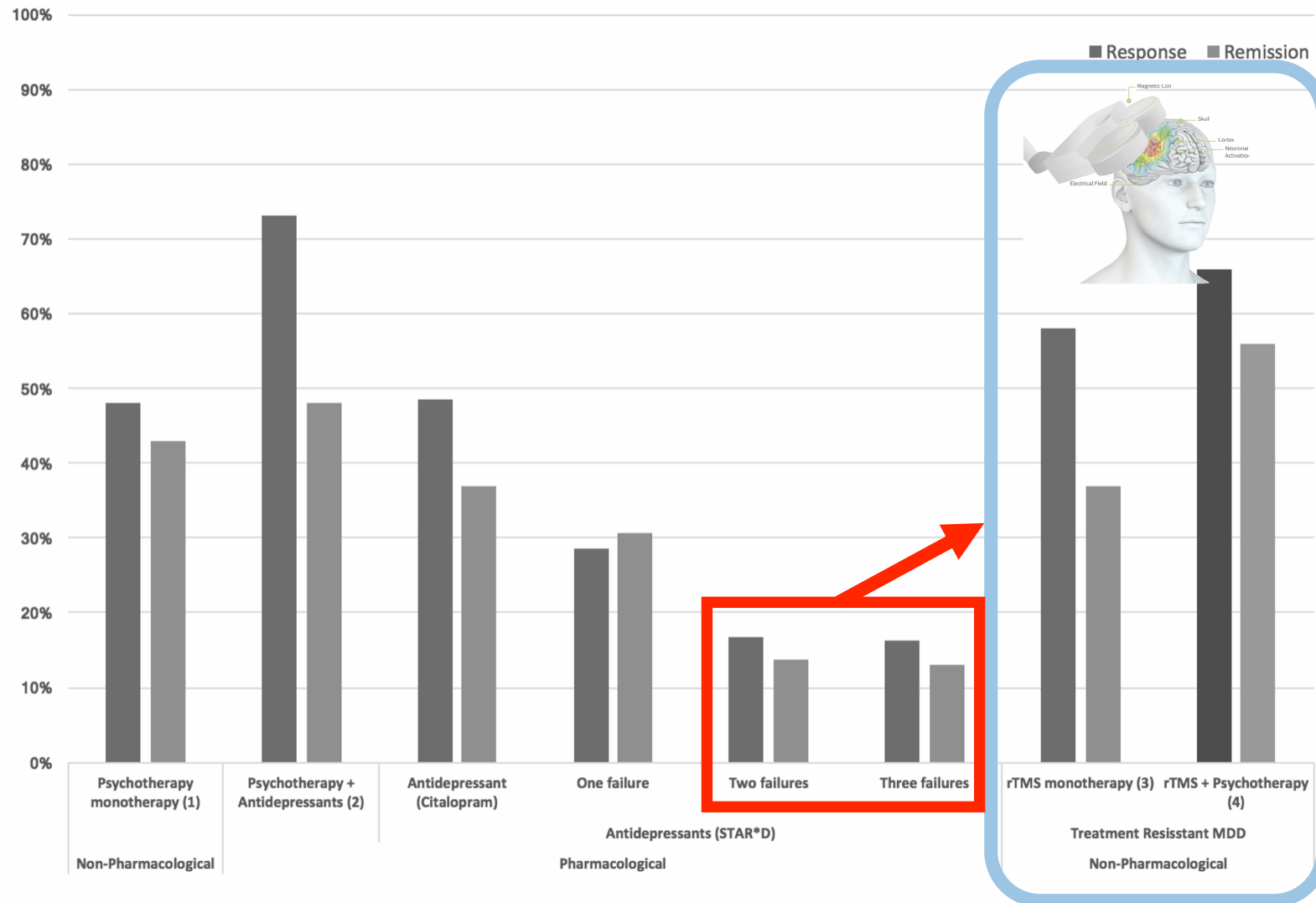
	PHQ-9 outcomes			
	Intent-to-treat sample		Completer sample	
	Total	Left only	Total	Left only
	(N = 5010)	(N = 2764)	(N = 3814)	(N = 2053)
Baseline PHQ-9	19.8 ± 4.1	19.4 ± 4.2	19.8 ± 4.1	19.3 ± 4.1
LOCF PHQ-9	9.6 ± 6.8	9.0 ± 6.7	8.6 ± 6.4	7.9 ± 6.2
Difference (Pre-Post)	10.2 ± 6.8	10.4 ± 6.8	11.1 ± 6.6	11.4 ± 6.6
Response rate	57.7%	60.6%	65.0%	68.9%
Remission rate	27.9%	31.2%	31.7%	35.8%
<i>CGI-S Outcomes</i>				
	<i>Intent-to-Treat Sample</i>		<i>Completer Sample</i>	
	Total	Left Only	Total	Left Only
	(N = 1489)	(N = 735)	(N = 1170)	(N = 615)
Baseline CGI-S	5.5 ± 0.8	5.3 ± 0.7	5.4 ± 0.8	5.3 ± 0.7
LOCF CGI-S	2.8 ± 1.5	2.5 ± 1.3	2.6 ± 1.4	2.3 ± 1.3
Difference (Pre-Post)	2.7 ± 1.5	2.8 ± 1.4	2.8 ± 1.4	2.9 ± 1.3
Response rate	69.4%	79.0%	75.0%	83.1%
Remission rate	46.5%	57.8%	52.5%	62.3%

Respons: > 50% klachtendaling

Remissie: PHQ-9 < 5



EFFECTIVITEIT VERGELEKEN MET ANDERE BEHANDELINGEN



Consensusverklaring NL-B, 2019

HF = LF rTMS

Response and Remission Rates Following High-Frequency vs. Low-Frequency Repetitive Transcranial Magnetic Stimulation (rTMS) Over Right DLPFC for Treating Major Depressive Disorder (MDD): A Meta-Analysis of Randomized, Double-Blind Trials

Xu Cao^{1,2}, Chunshan Deng¹, Xiaolin Su¹ and Yi Guo^{1*}

¹ Department of Neurology, Shenzhen People's Hospital, Second Clinical College, Jinan University, Shenzhen, China

² Department of Neurology, Shenzhen University General Hospital, Shenzhen, China

Frontiers in Psychiatry, 2018

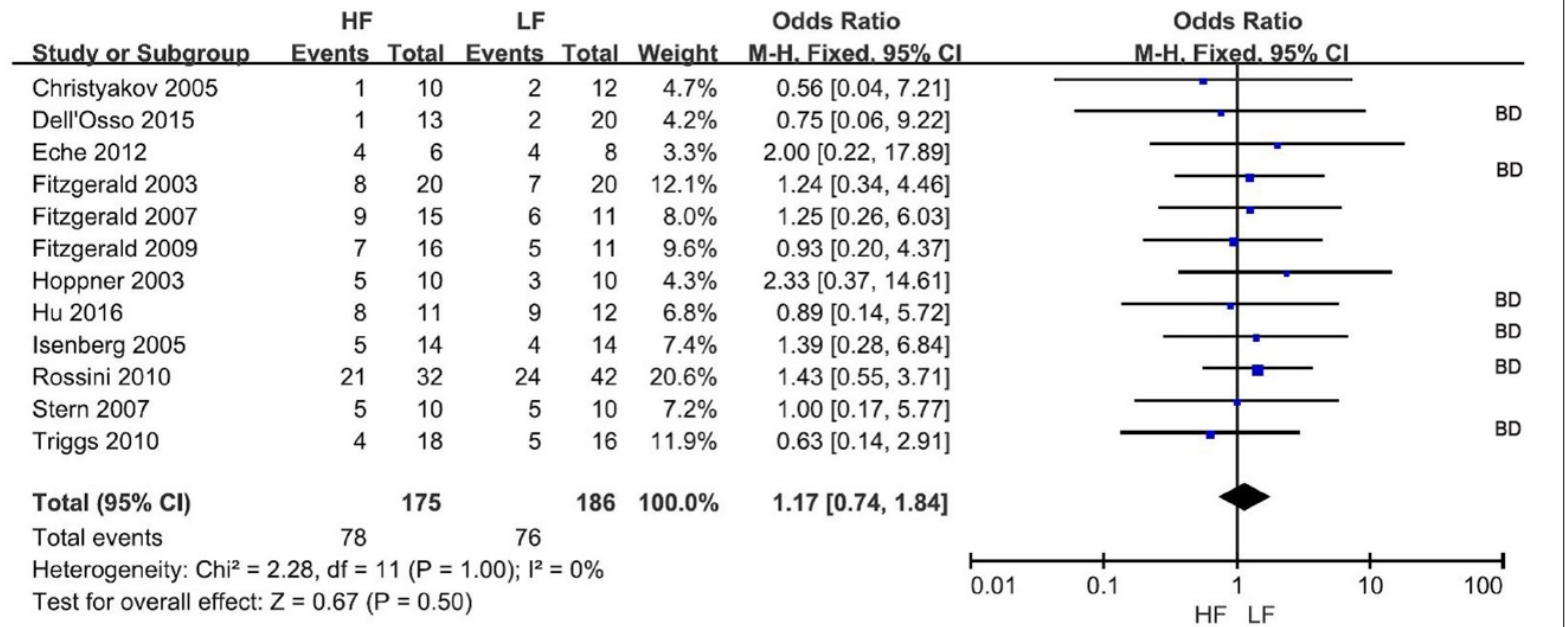


FIGURE 2 | Meta-analysis of HF vs. LF-rTMS for MDD: response rate. HF, High Frequency; LF, Low Frequency; BD, Study in which more than one bipolar depressive patient involved.

STANDAARD vs. HOOG AANTAL PULSEN

A pragmatic randomized controlled trial exploring the relationship between pulse number and response to repetitive transcranial magnetic stimulation treatment in depression

Paul B. Fitzgerald ^{a, b, *}, Kate E. Hoy ^b, John Reynolds ^h, Ajeet Singh ^c, Ranil Gunewardene ^d, Christopher Slack ^e, Samir Ibrahim ^f, Zafiris J. Daskalakis ^g

2020

N = 300

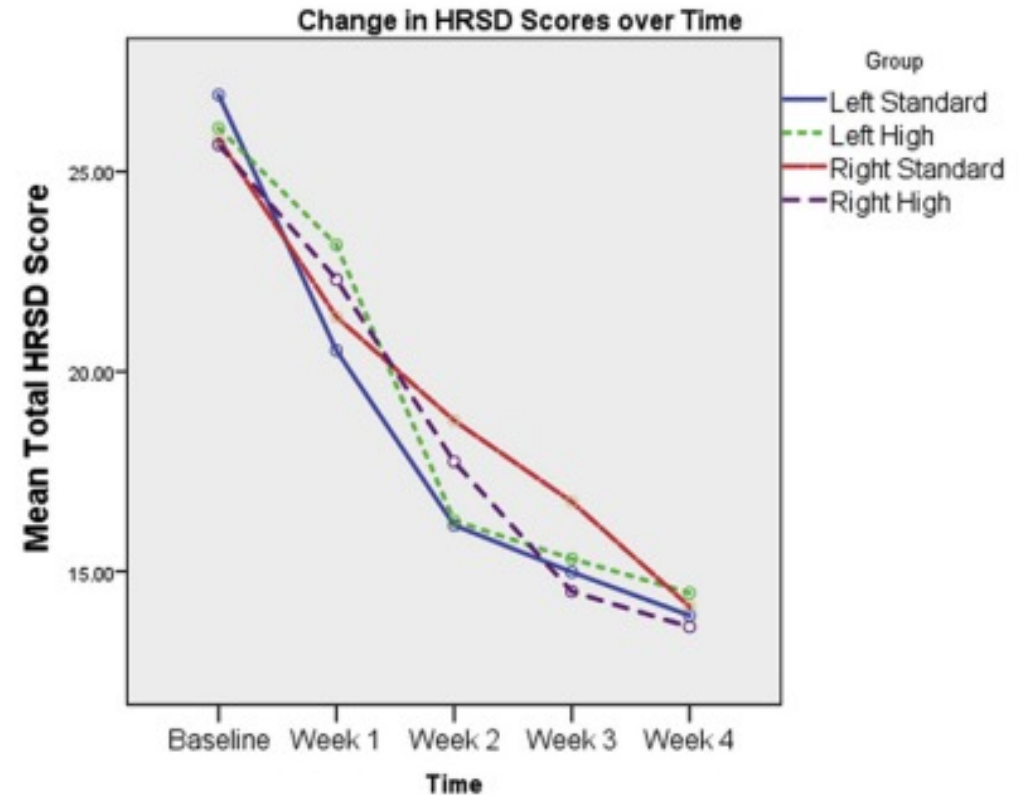
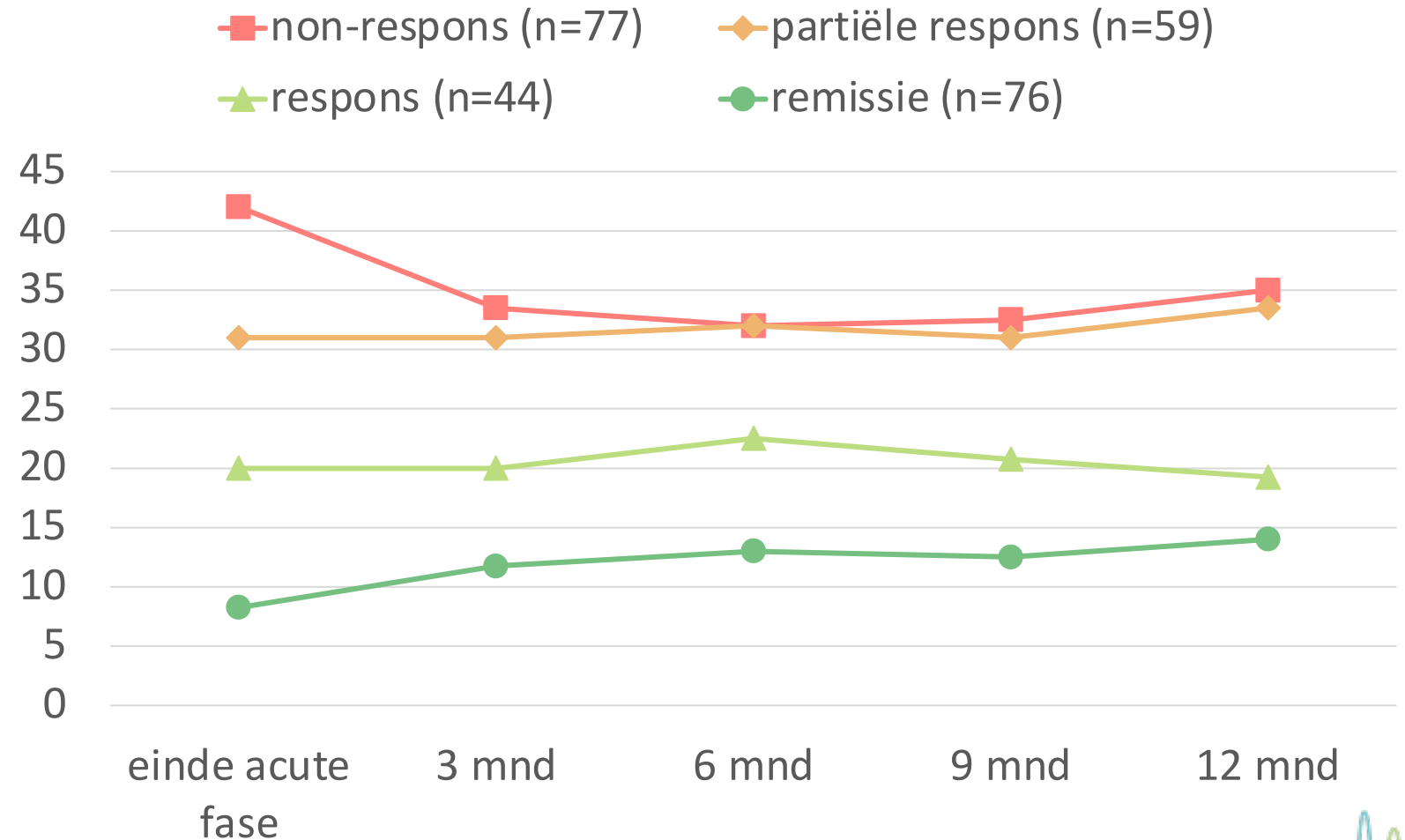


Fig. 2. Mean Hamilton Depression Rating Scale Scores at each study time point.

“EVERYBODY STAYS IN THEIR LANE”

Dunner et al 2014: Effect bleef behouden bij 63% van de responders (n=275)

Senova et al 2019: rTMS is a durable treatment for depression, with sustained responder rates of 50% up to 1 year after a successful induction course of treatment.



rTMS IS EEN VEILIGE METHODE

Bijwerkingen:

- Hoofdpijn (5-25%)
- Spiertrekkingen



Common

- Epileptisch insult (0,003%; <1 insult/60,000 sessies)
- Gehoorbeschadiging (oude apparatuur)
- Gedragsverandering (naar hypomanie)



Potential but rare
to very rare



Hypomanic/manic switch after transcranial magnetic stimulation in mood disorders: A systematic review and meta-analysis

2021

Andrea Miuli, Gianna Sepede, Gianfranco Stigliano, Alessio Mosca, Francesco Di Carlo, Giacomo d'Andrea, Aliseo Lalli, Maria Chiara Spano, Mauro Pettorruso, Giovanni Martinotti, Massimo di Giannantonio

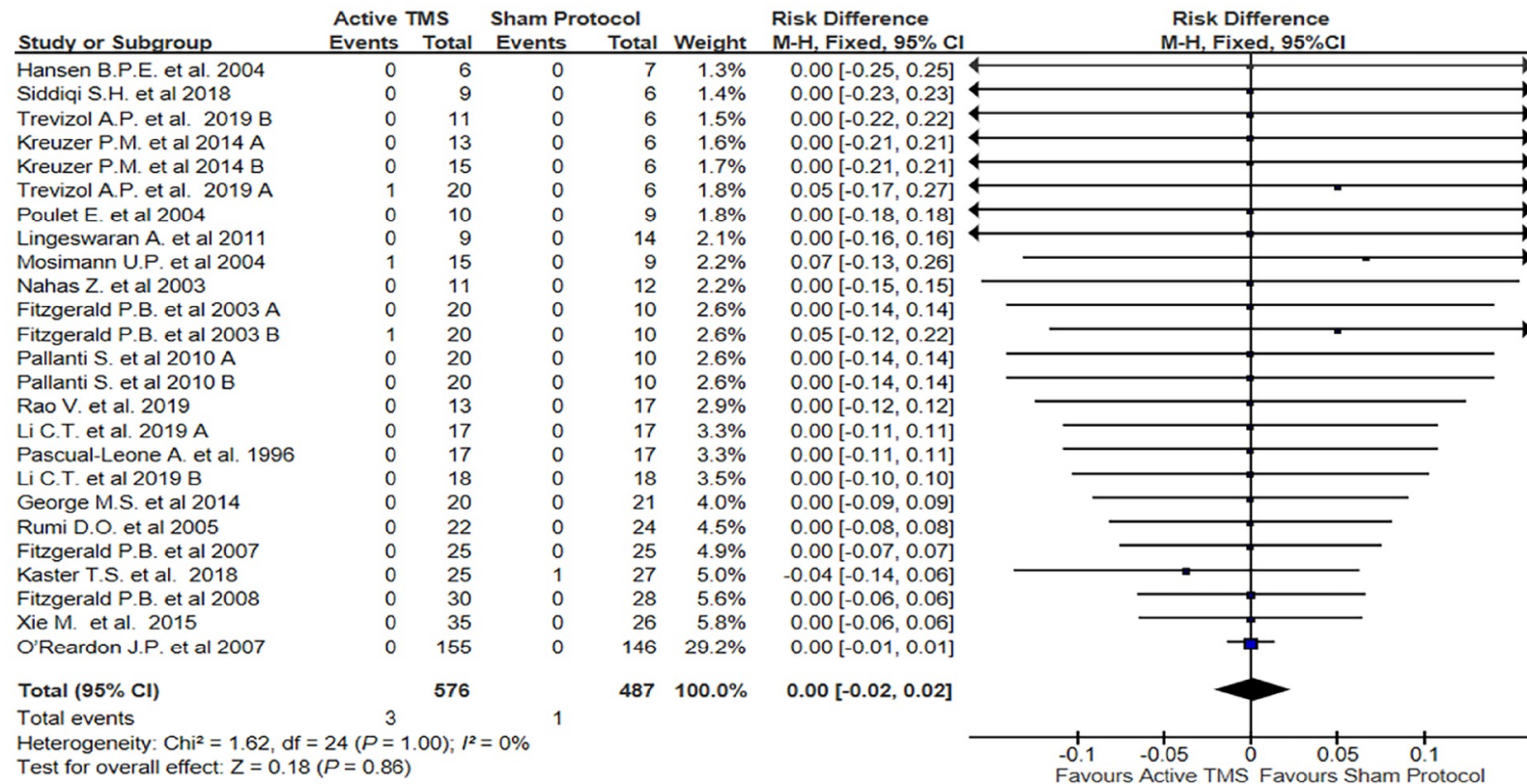


Figure 3 Forest plot: Risk to develop a hypomanic/manic switch after a transcranial magnetic stimulation protocol. TMS: Transcranial

Simultaneous rTMS and psychotherapy in major depressive disorder: Clinical outcomes and predictors from a large naturalistic study

Lana Donse ^{a,b}, Frank Padberg ^c, Alexander T. Sack ^{a,d}, A. John Rush ^e, Martijn Arns ^{b,f,g,*}

rTMS + CGT:

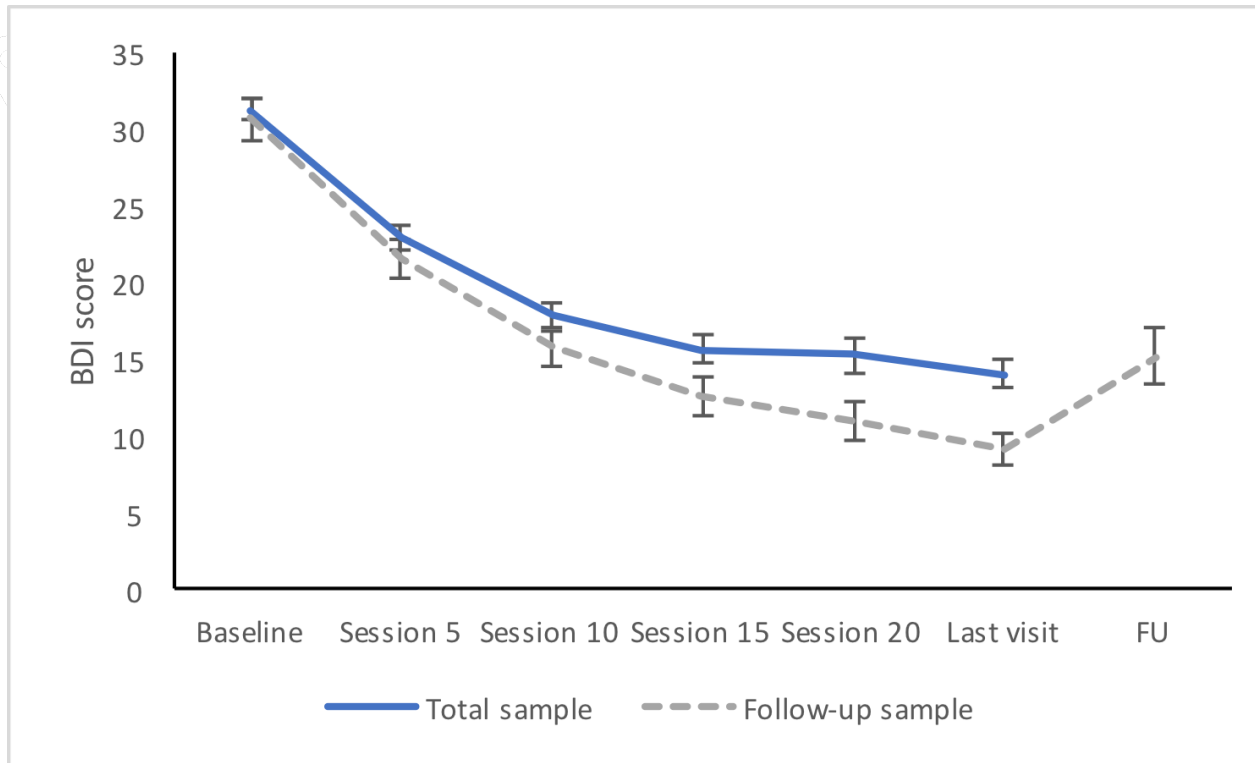
66% respons; 56% remissie

Andere studies rTMS only:

- Blumberger ea (N=385; 48% response; 30% remissie)
- Carpenter ea (N=307: 58% response; 37% remissie)
- Fitzgerald ea (N=1132: 44% response; 31% remissie)

Follow-up na 6 m: 65% behield resultaat

N = 196



OVERIGE INDICATIES

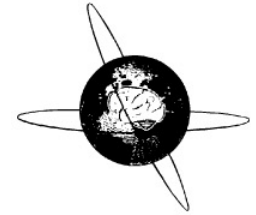


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Clinical Neurophysiology

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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 Lazzaroⁱ, 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}, Fady Rachid^{ak}, Irena Rektorová^{al,am}, Simone Rossi^{an}, Hanna Sahlsten^{ao}, Martin Schecklmann^r, David Szekely^{ap}, Ulf Ziemann^{aq}

ANGSTSTOORNISSEN

- Gegeneraliseerde angst (large effect)
- PTSS (large effect)
- Paniekstoornis: nog onbekend
- Sociale angststoornis: nog onbekend

Transcranial magnetic stimulation in anxiety and trauma-related disorders: A systematic review and meta-analysis

Patricia Cirillo^{1,2,3} | Alexandra K. Gold^{4,5} | Antonio E. Nardi³ | Ana C. Ornelas³ |
Andrew A. Nierenberg^{1,5,6} | Joan Camprodon^{1,2,5} | Gustavo Kinrys^{1,5,6}  2019

Abstract

Background: Transcranial magnetic stimulation (TMS) has been evaluated as an effective treatment option for patients with major depressive disorder. However, there are limited studies that have evaluated the efficacy of TMS for other neuropsychiatric disorders such as anxiety and trauma-related disorders. We reviewed the literature that has evaluated TMS as a treatment for anxiety and trauma-related disorders.

Methods: We searched for articles published up to December 2017 in Embase, Medline, and ISI Web of Science databases, following the Preferred Items for Reporting of Systematic Reviews and Meta-Analyses (PRISMA) statement. Articles ($n = 520$) evaluating TMS in anxiety and trauma-related disorders were screened and a small subset of these that met the eligibility criteria ($n = 17$) were included in the systematic review, of which nine evaluated TMS in posttraumatic stress disorder (PTSD), four in generalized anxiety disorder (GAD), two in specific phobia (SP), and two in panic disorder (PD). The meta-analysis was performed with PTSD and GAD since PD and SP had an insufficient number of studies and sample sizes.

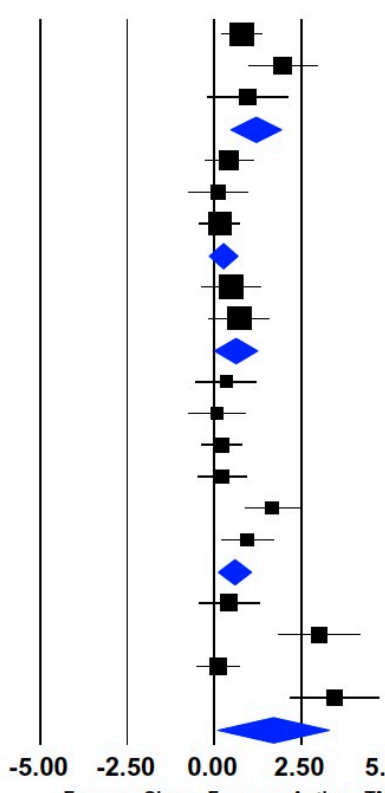
Results: Among anxiety and trauma-related disorders, TMS has been most widely studied as a treatment for PTSD. TMS demonstrated large overall treatment effect for both PTSD (ES = -0.88, 95% CI: -1.42, -0.34) and GAD (ES = -2.06, 95% CI: -2.64, -1.48), including applying high frequency over the right dorsolateral prefrontal cortex. Since few studies have evaluated TMS for SP and PD, few conclusions can be drawn.

Conclusions: Our meta-analysis suggests that TMS may be an effective treatment for GAD and PTSD.

A Meta-Analysis of the Effectiveness of Different Cortical Targets Used in Repetitive Transcranial Magnetic Stimulation (rTMS) for the Treatment of Obsessive-Compulsive Disorder (OCD)

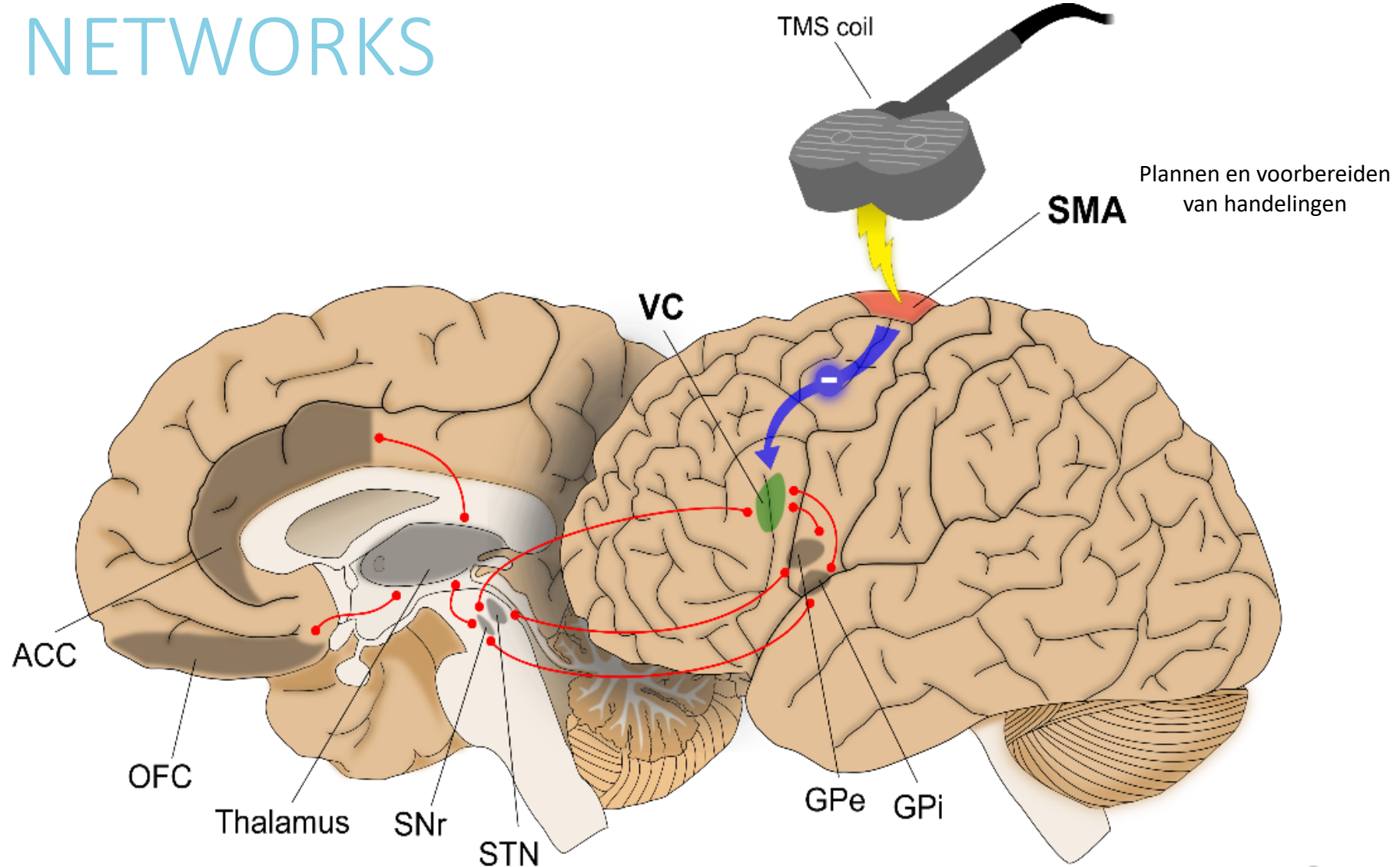
Simone Rehn^{1,2}  • Guy D. Eslick³ • Vlasios Brakoulias⁴

2018

Group by Target	Study name	Statistics for each study				Hedges's g and 95% CI
		Hedges's g	Lower limit	Upper limit	p-Value	
DLPFC	Ma [45]	0.79	0.20	1.38	0.009	
DLPFC	Haghighi [47]	1.97	0.95	2.98	0.000	
DLPFC	Jahangard [50]	0.96	-0.24	2.15	0.116	
DLPFC		1.18	0.45	1.91	0.002	
LDLPFC	Prasko [40]	0.43	-0.29	1.15	0.239	
LDLPFC	Sachdev [27]	0.11	-0.77	1.00	0.799	
LDLPFC	Badawy [42]	0.16	-0.45	0.77	0.604	
LDLPFC		0.24	-0.17	0.65	0.253	
OFC	Ruffini [34]	0.49	-0.38	1.35	0.272	
OFC	Nauczyciel et al. [33]	0.72	-0.17	1.61	0.115	
OFC		0.60	-0.02	1.22	0.059	
RDLPFC	Alonso [26]	0.34	-0.56	1.23	0.459	
RDLPFC	Kang [41]	0.07	-0.77	0.91	0.862	
RDLPFC	Sarkhel [43]	0.22	-0.38	0.81	0.471	
RDLPFC	Mansur [44]	0.22	-0.51	0.96	0.549	
RDLPFC	Elbeh [49]	1.67	0.85	2.48	0.000	
RDLPFC	Seo [51]	0.95	0.18	1.73	0.016	
RDLPFC		0.57	0.09	1.04	0.020	
SMA	Mantovani [32]	0.43	-0.46	1.32	0.342	
SMA	Gomes [30]	3.01	1.81	4.22	0.000	
SMA	Pelissolo [38]	0.10	-0.54	0.75	0.756	
SMA	Hawken [31]	3.46	2.15	4.76	0.000	
SMA		1.68	0.07	3.29	0.041	

Subgroups	k	Heterogeneity I ² (%)	P for I ²	Hedge's g (95% CI)	P for Hedge's g
Cortical target					
SMA	4	91.04	<0.001	1.68 (0.07–3.29)	0.041
B-DLPFC	3	48.67	0.14	1.18 (0.45–1.91)	0.002
R-DLPFC	6	57.19	0.04	0.58 (0.20–0.97)	0.003
L-DLPFC	3	0	0.81	0.24 (–0.17–0.65)	0.253
OFC	2	0	0.72	0.60 (–0.02–1.22)	0.059
Frequency					
High	7	53.30	0.05	0.55 (0.13–0.97)	0.01
Low	11	77.35	<0.001	0.97 (0.42–1.51)	0.001
< 4 weeks post-treatment	6	84.48	<0.001	0.81 (0.01–1.60)	0.047
12 weeks post-treatment	3	79.27	0.008	1.26 (0.12–2.39)	0.030

OCD NETWORKS



From: Fitzgerald & Anderson (2016)



rTMS IN DE KLINISCHE PRAKTIJK

VERGOEDE ZORG



Voorwaarden:

- Depressieve episode
- Therapieresistentie: minstens twee behandelingen volgens de multidisciplinaire richtlijn
- Combineren met psychologische behandeling

Consensusverklaring voor de toepassing van rTMS bij depressie in Nederland en België

M. ARNS, C. BERVOETS, P. VAN EIJDHOVEN, C. BAEKEN, O.A. VAN DEN HEUVEL, A. ALEMAN, D.J.L.G. SCHUTTER, Y. VAN DER WERF, S. VAN BELKUM, I.E. SOMMER, R. VAN RUTH, B. HAARMAN, J. SPIJKER, A.T. SACK

ACHTERGROND Sinds 2017 komt rTMS (repetitieve transcraniële magnetische hersenstimulatie) voor vergoeding in aanmerking voor de behandeling van therapieresistente depressie in de specialistische ggz in Nederland.

DOEL Een aanzet geven voor een richtlijn in Nederland en België voor de veilige en effectieve toepassing van rTMS bij de behandeling van depressie.

METHODE Formuleren van adviezen inzake de implementatie van rTMS als behandeling van depressie.

CANMAT Guidelines

Canadian Network for Mood and Anxiety Treatments (CANMAT) 2016 Clinical Guidelines for the Management of Adults with Major Depressive Disorder: Section 4. Neurostimulation Treatments



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Guidelines

Safety, ethical considerations, and application guidelines for the use of transcranial magnetic stimulation in clinical practice and research[☆]

Simone Rossi^{a,*}, Mark Hallett^b, Paolo M. Rossini^{c,d}, Alvaro Pascual-Leone^e and The Safety of TMS Consensus Group¹

Published in final edited form as:

J Clin Psychiatry. 2018 ; 79(1): . doi:10.4088/JCP.16cs10905.

Consensus Recommendations for the Clinical Application of Repetitive Transcranial Magnetic Stimulation (rTMS) in the Treatment of Depression

Shawn M. McClintock, PhD, MSCS^{a,b,*}, Irving M. Reti, MBBS^c, Linda L. Carpenter, MD^d, William M. McDonald, MD^e, Marc Dubin, MD, PhD^f, Stephan F. Taylor, MD^g, Ian A. Cook, MD^h, John O'Reardon, MDⁱ, Mustafa M. Husain, MD^{a,b}, Christopher Wall, MD^j, Andrew D. Krystal, MD^{b,k}, Shirlene M. Sampson, MD^l, Oscar Morales, MD^m, Brent G. Nelson, MDⁿ, Vassilios Latoussakis, MD^f, Mark S. George, MD^{o,p}, and Sarah H. Lisanby, MD^b on behalf of both the National Network of Depression Centers rTMS Task Group and the American Psychiatric Association Council on Research Task Force on Novel Biomarkers and Treatments

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neuroCare

VEILIGHEID

Exclusie:

- Intracraniële metalen of magnetische onderdelen: wat is toegestaan voor MRI scan is toegestaan voor rTMS
- Geïmplanteerde apparatuur bijv. cochleair implantaat
- Epilepsie/epileptisch insult in vg

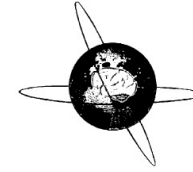


Nee, tenzij:

- Zwangerschap (effecten onbekend)
- Jongeren onder 18 jaar (effecten onbekend)

Overige aandachtspunten:

- Voorgeschiedenis van CVA, hersenoperatie, etc.
- Medicatie die drempel voor insult verlaagt (te hoge lithium dosis, TCA etc.)
- Gebruik van off label medicatie
- Plotselinge stop met alcoholgebruik of gebruik benzodiazepines
- Slaapdeprivatie
- Suïcidaliteit
- Abnormaal EEG



Guidelines

Safety, ethical considerations, and application guidelines for the use of transcranial magnetic stimulation in clinical practice and research [☆]

Simone Rossi ^{a,*}, Mark Hallett ^b, Paolo M. Rossini ^{c,d}, Alvaro Pascual-Leone ^e and The Safety of TMS Consensus Group ¹

Length of train in seconds

Frequency (Hz)	Intensity (% of MT)				
	90%	100%	110%	120%	130%
1	>1800 ^a	>1800	>1800	>360	>50
5	>10	>10	>10	>10	>10
10	>5	>5	>5	4.2	2.9
20	2.05	2.05	1.6	1.0	0.55
25	1.28	1.28	0.84	0.4	0.24

Inter-train interval (ms)	Stimulus intensity (% of MT)							
	100%		105%		110%		120%	
<i>Part A</i>								
5000	Safe		Safe		Safe		Insufficient data	
1000	Unsafe (EMG spread after 3 trains)		Unsafe ^a		Unsafe (EMG spread after 2 trains)		Unsafe (EMG spread after 2 trains)	
250	Unsafe ^a		Unsafe ^a		Unsafe (EMG spread after 2 trains)		Unsafe (EMG spread after 3 trains)	
<i>Part B</i>								
Frequency (Hz)	100%		110%		120%		130%	
	Duration (s)/pulses		Duration (s)/pulses		Duration (s)/pulses		Duration (s)/pulses	
1	>270	>270	>270	>270	>180	>180	50	50
5	10	50	10	50	10	50	10	50
10	5	50	5	50	3.2	32	2.2	22
20	1.5	30	1.2	24	0.8	16	0.4	8
25	1.0	25	0.7	17	0.3	7	0.2	5

^a These stimulus parameters are considered unsafe because adverse events occurred with stimulation of lower intensity or longer inter-train interval, but no adverse effects were observed with these parameters.

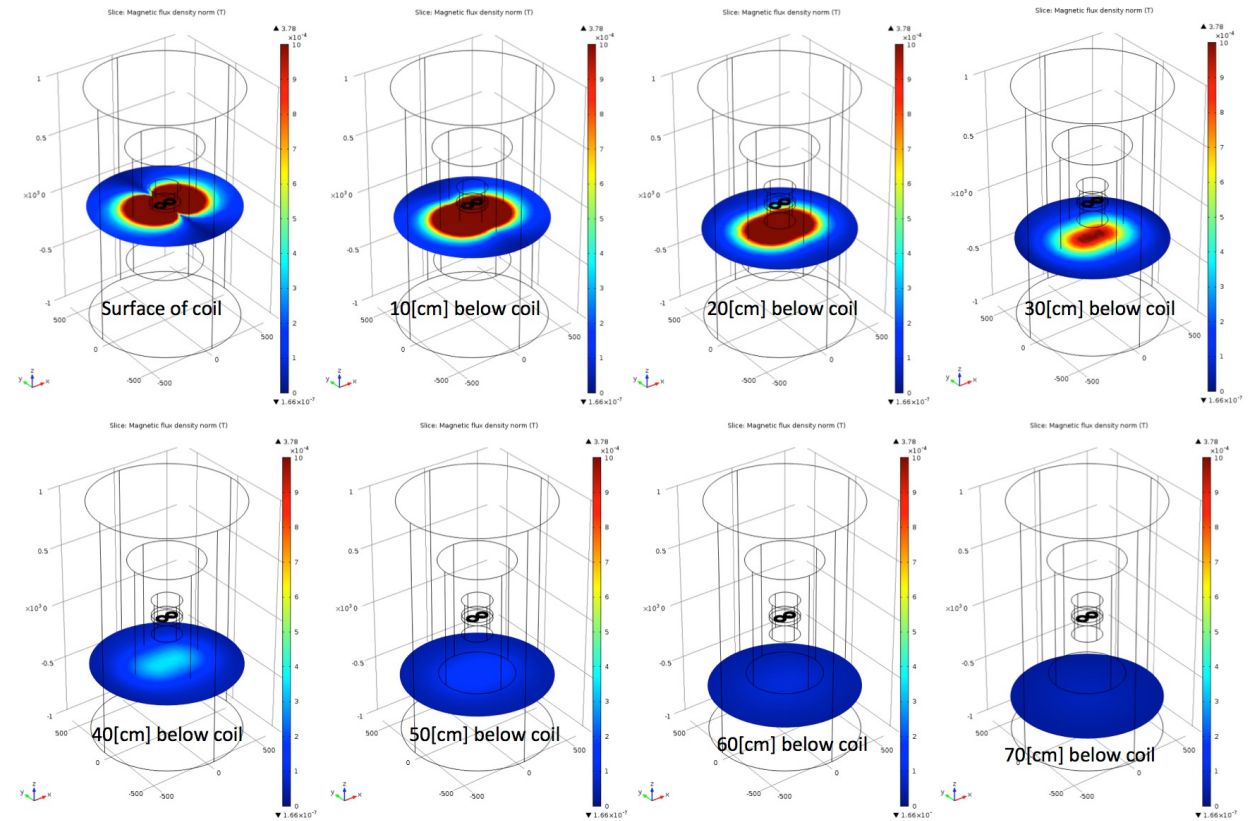
^a In Japan, up to 5000 pulses have been applied without safety problems (communication of Y. Ugawa).

Rossi et al. (2009)

VEILIGHEID BEHANDELAAR



- Sterk magnetisch veld $>2T$, maar blootstelling is kortdurend (1ms): In een sessie in totaal 1.5 sec blootstelling
- Voorkom onnodige blootstelling (afstand $>70cm$)



Saturated Linear Scale, Min. 0[T] Max. 1[mT] showing how magnetic field falls off with distance

Field Decay From Coil

rTMS en CGT: WAAROM COMBINEREN?

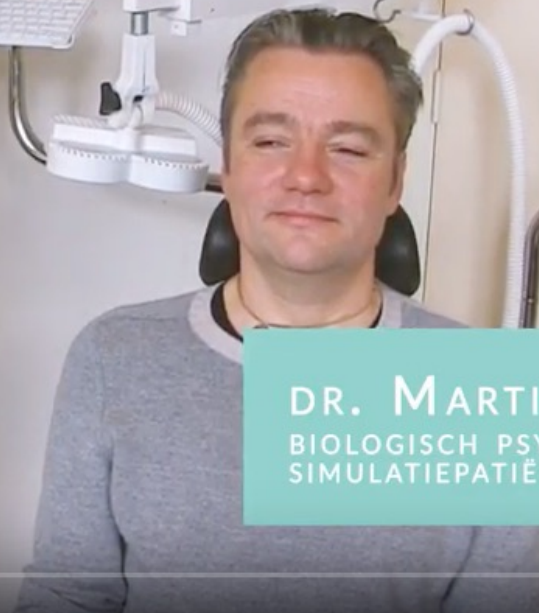
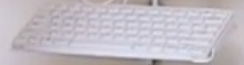
- Psychische stoornissen zijn multifactorieel
- rTMS steekt in op neurobiologische factoren
- Psychotherapie steekt in op onderhoudende factoren en veranderingen in denk- en gedrag patronen
- 20-40 sessies, 2-5x per week



PSYXPERT



MYRTHE VAN EERDT
PSYCHOLOG NIP, RTMS /
NEUROFEEDBACK SPECIALIST



DR. MARTIJN ARNS
BIOLOGISCH PSYCHOLOOG/
SIMULATIEPACIËNT rTMS

0:12 / 2:43



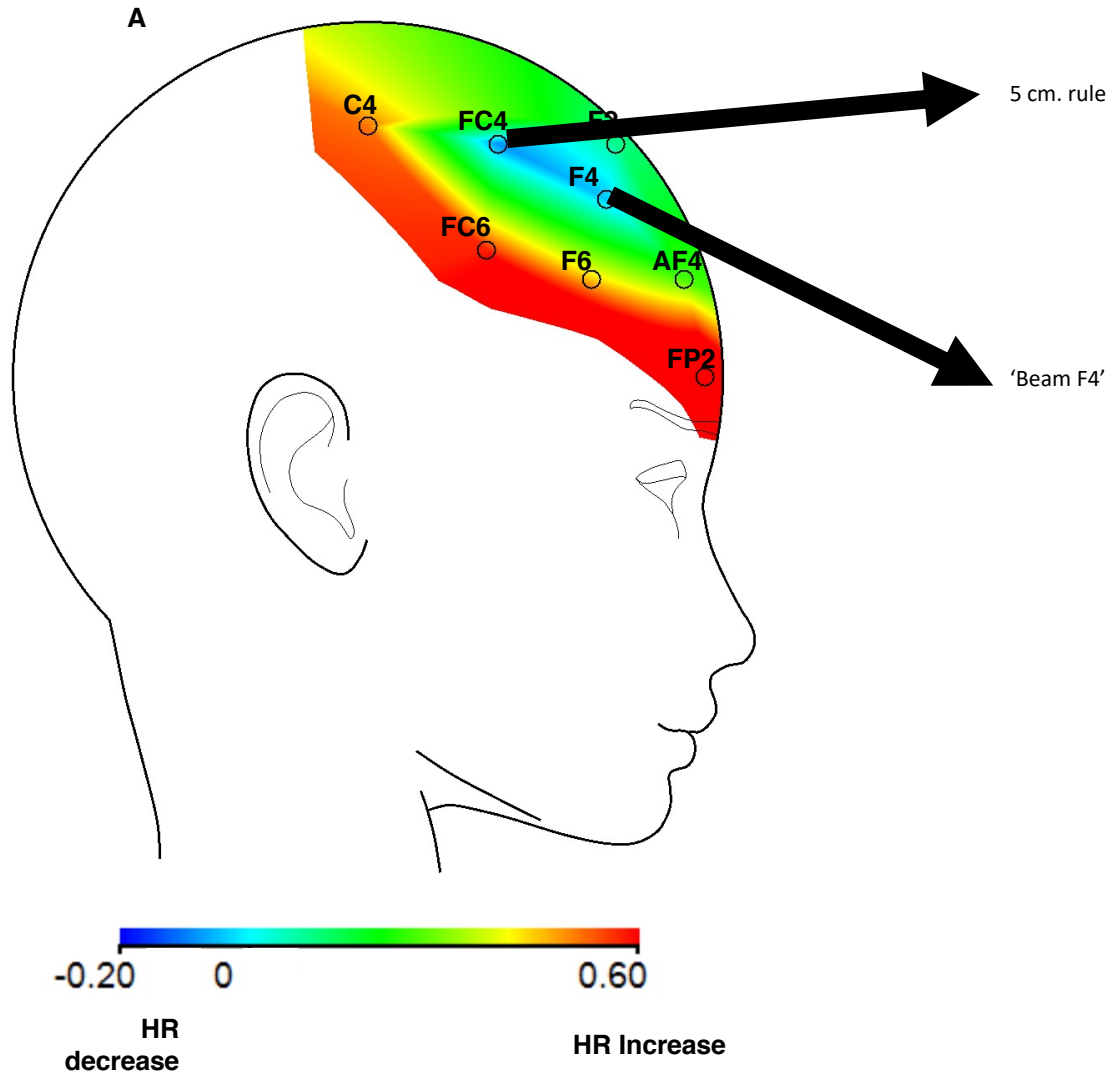
Begin van een behandeling





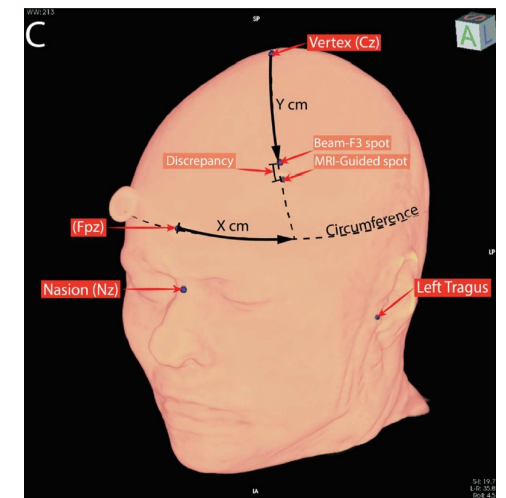
NIEUWE ONTWIKKELINGEN

NEUROCARDIAC GUIDED rTMS



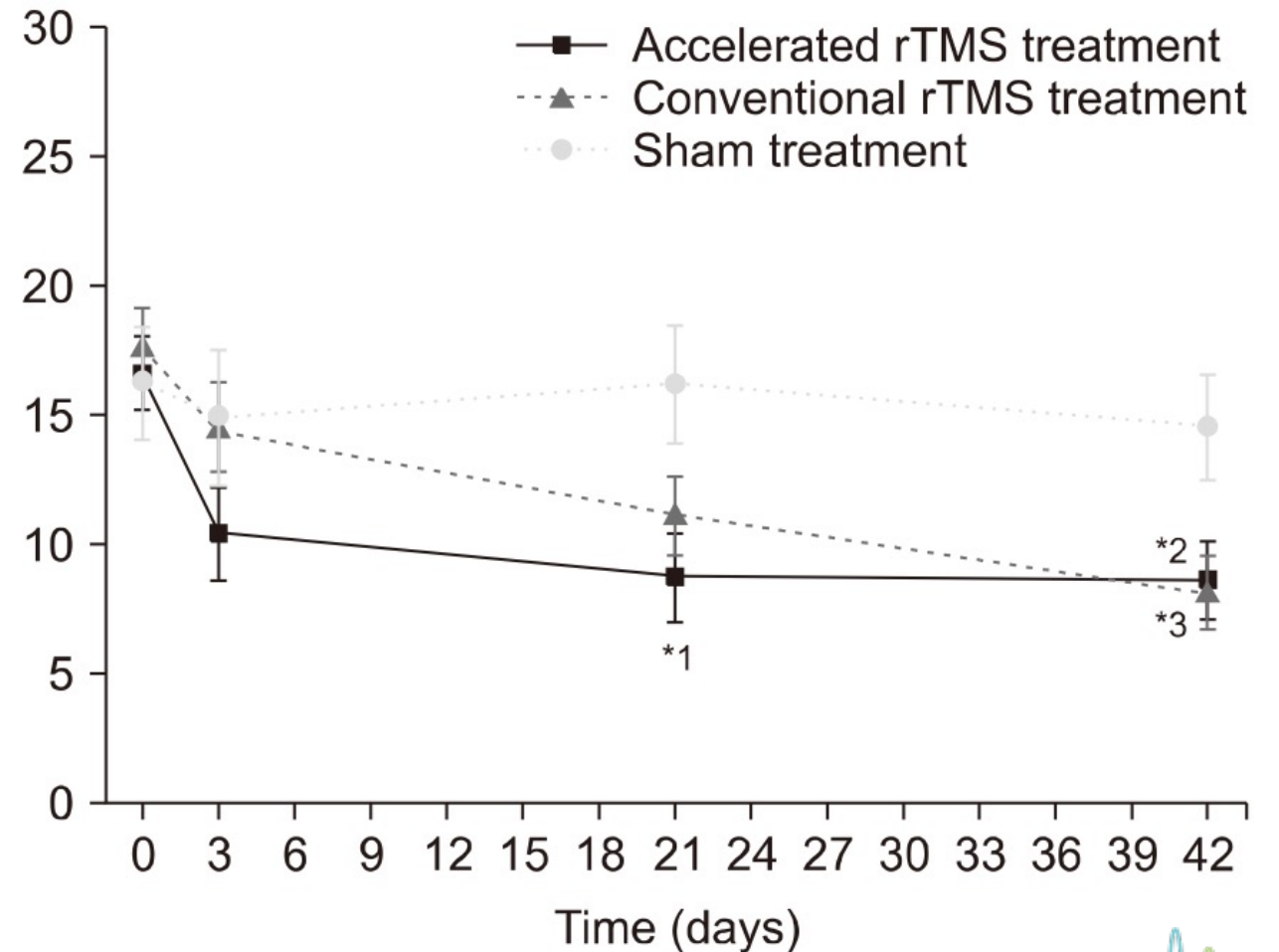
Carpenter et al. (N=307; 58% response; 37% remission)

Blumberger et al. (N=385; 48% response; 30% remission)



ACCELERATED: MEERDERE SESSIES PER DAG

Accelerated: 5 sessies/dag, 3 dagen
Conventional: 1 sessie/dag, 15 dagen
Sham: 5 sessies/dag, 3 dagen



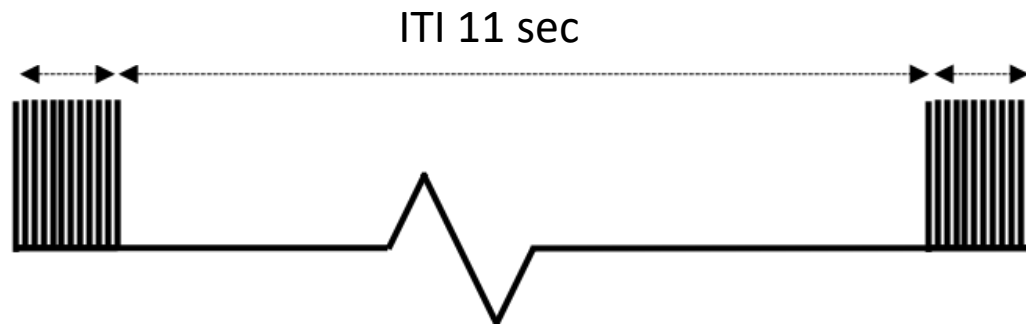
Kim et al 2021

DASH VS STANDARD



Comparison of clinical outcomes with two Transcranial Magnetic Stimulation treatment protocols for major depressive disorder

Linda L. Carpenter^{a, b, *}, Scott T. Aaronson^{c, d}, Todd M. Hutton^e, Miriam Mina^f, Kenneth Pates^{g, h}, Sarah Verdolivaⁱ, W. Scott West^j, Harold A. Sackeim^{k, l}



	Completer Sample		P-Value*
	Standard (N = 467)	Dash (N = 1112)	
Baseline PHQ-9	19.8 ± 4.2	19.0 ± 4.1	0.002
End of Acute Course PHQ-9	7.9 ± 6.1	7.9 ± 6.2	0.993
Difference (Pre-Post)	11.8 ± 6.8	11.2 ± 6.5	0.057
Response Rate	70.2%	68.3%	0.438
Remission Rate	35.5%	35.9%	0.899

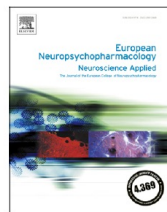
NIEUWE LOCATIES

European Neuropsychopharmacology (2018) 28, 109-117



ELSEVIER

www.elsevier.com/locate/euroneuro



1 Hz rTMS of the right orbitofrontal cortex for major depression: Safety, tolerability and clinical outcomes

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Zafiris J. Daskalakis^{b,d,e}, Daniel M. Blumberger^{b,d,e},
Jonathan Downar^{a,b,d,f,*}

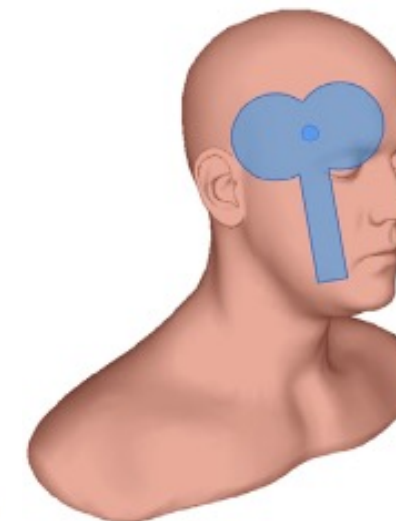
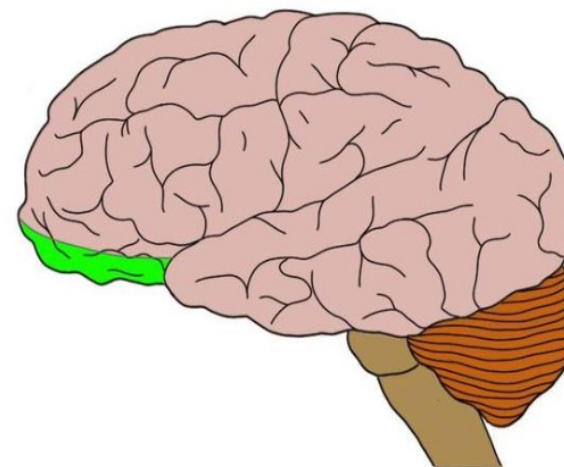


Table 3 Treatment outcomes for MDD patients undergoing 1 Hz right OFC-rTMS.

	Overall	rTMS previous non-responder	rTMS naive
BDI-II			
Response	15/42 (35.7%)	9/30 (30.0%)	6/12 (50.0%)
Remission	10/42 (23.8%)	7/30 (23.3%)	3/12 (25.0%)
% improvement	36.5 ± 26.5%	32.9 ± 25.6%	45.6 ± 27.6%

Response is defined as a >50% decrease in symptoms; remission defined as a final BDI-II score of ≤ 12. % improvement is calculated from baseline to final score. BDI-II, Beck Depression Inventory-II.

rTMS BIJ NIET-THERAPIERESISTENTE DEPRESSIE

RESEARCH ARTICLE

Open Access

A systematic literature review of the clinical efficacy of repetitive transcranial magnetic stimulation (rTMS) in non-treatment resistant patients with major depressive disorder



Jeffrey Voigt^{1*}, Linda Carpenter² and Andrew Leuchter³

Results: Electronic and other sources identified 165 after duplicates were removed. Twenty two articles were assessed for eligibility and ultimately 10 articles were included in the systematic review and graded. Six articles were graded high quality (CEBM/GRADE: 1c/B) demonstrating that the use of rTMS was clinically efficacious in patients after ≤ 1 medication trial. Four additional trials demonstrated a positive effect of rTMS in patients after ≤ 1 medication trial but were of a lower quality.

Conclusion: The use of rTMS in patients after ≤ 1 medication trial should be considered. US payers should consider revising their coverage policies to include the use of rTMS in these patients.

CASUS

- 19-jarige vrouw
- Sinds 6 jaar last van ernstige stemmings- en angstklachten met suicidaliteit
- Voorgeschiedenis: psychotische decompensatie (stemmen horen en schimmen zien) en anorexia nervosa
- Teruggetrokken uit sociale contacten, vastgelopen op school
- Meerdere behandelingen gehad
- 4 weken rTMS + CGT, 8 sessies per week (totaal 25 sessies): activering, slaaphygiëne, uitdagen van negatieve gedachten, verbeteren zelfbeeld, terugvalpreventie



CASUS INTENSIEVE BEHANDELING

		Intake	5 th session	13 th session	21 th session	Outtake
BDI		53	41	38	16	13
DASS	Depression	40	36	19	11	6
	Anxiety	30	13	10	6	4
	Stress	32	19	14	8	10
PSQI		8	7	7	5	5
ADHD RS	Inattention	-	-	-	-	-
	Hyperactivity	-	-	-	-	-
YBOCS	Total	-	-	-	-	-
	Obsessions	-	-	-	-	-
	Compulsions	-	-	-	-	-
GDS (optional)		-	-	-	-	-
Medication						
Protocol			1Hz rTMS op rechter DLPFC	1Hz rTMS op rechter DLPFC	Dubbel protocol: 10Hz op linker DLPF toegevoegd	



A young child with their back to the camera, wearing a green puffer vest over a blue and white striped long-sleeve shirt and blue pants. The child's arms are raised in a gesture of triumph or joy. They are standing in a field of tall, dry grasses. The background is a bright, hazy sunset or sunrise over a landscape, with the sun low on the horizon, creating a warm, golden glow. The overall mood is one of hope and achievement.

**Bedankt voor de
aandacht!**

Kijk ook eens op onze website:
www.neurocaregroup.nl

OVERIGE INDICATIES: SOMATIEK

- Neurologische diagnostiek
- Motore gevolgen van CVA, afasie na CVA
- Motore symptomen ziekte van Parkinson
- Tics, Tourette syndroom
- Epilepsie
- Chronische pijn
- Alzheimer

The screenshot shows a website header with logos for 'De Hoogstraat Revalidatie' and 'UMC Utrecht Kenniscentrum Revalidatiegeneeskunde Utrecht'. Navigation links include 'Publicaties', 'Producten', 'Projecten', 'Onderzoekstages', and 'Cor'. A large orange banner contains a white button labeled 'Projecten'. Below the banner is a breadcrumb trail: 'Home > Projecten > Beroerte > B-STARS: Brain Stimulation for Arm Recovery after Stroke'. The main content area is split into two columns. The left column lists categories: 'Diagnoses', 'Beroerte', 'Cerebrale parese', 'Dwarslaesie', 'Spierziekten', and 'Thema's'. The right column features the title 'B-STARS: Brain Stimulation for Arm Recovery after Stroke' and a paragraph of text: 'Jaarlijks krijgen ongeveer 45.000 Nederlanders een beroerte. Motorische stoornissen zijn de meest voorkomende verstoringen na een beroerte. Patiënten kunnen niet of moeilijk spierbewegingen uitvoeren met de aangedane arm/hand. Revalidatieprogramma's dragen bij aan (gedeeltelijk) herstel, maar veel patiënten hebben een chronisch sensorimotorisch tekort. De beschikbare therapie (thrombectomie en thrombolysie) is maar een voor kleine groep patiënten geschikt, dus er is een dringende behoefte aan een aanvullende therapie. Parente et al.

EFFECT VERSCHILLENDE PROTOCOLLEN

JAMA Psychiatry | Original Investigation | META-ANALYSIS

Repetitive Transcranial Magnetic Stimulation for the Acute Treatment of Major Depressive Episodes A Systematic Review With Network Meta-analysis

Andre R. Brunoni, MD, PhD; Anna Chaimani, PhD; Adriano H. Moffa, PsyD, MPhil; Lais B. Razza, PsyD; Wagner F. Gattaz, MD, PhD; Zafiris J. Daskalakis, MD, PhD; Andre F. Carvalho, MD, PhD
2016

Key Points

Question What is the most effective and tolerable repetitive transcranial magnetic stimulation (rTMS) intervention for acute depressive disorder?

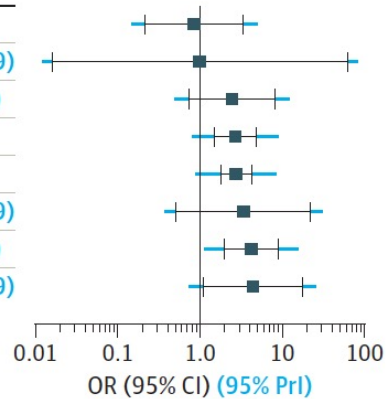
Findings In this systematic review and network meta-analysis collecting data from 81 randomized clinical trials (4233 patients), priming low-frequency, bilateral, high-frequency, low-frequency, and θ -burst rTMS—but not novel (accelerated, synchronized, and deep rTMS) strategies—were more effective than sham regarding response rates. All interventions were at least as acceptable as sham.

Meaning Only few differences were found in clinical efficacy and acceptability between the different rTMS; current evidence cannot support novel rTMS interventions for treating acute depression.

Figure 3. Forest Plot Showing the Network Relative Odds Ratios (ORs) With Their 95% CIs and Predictive Intervals (PrI)

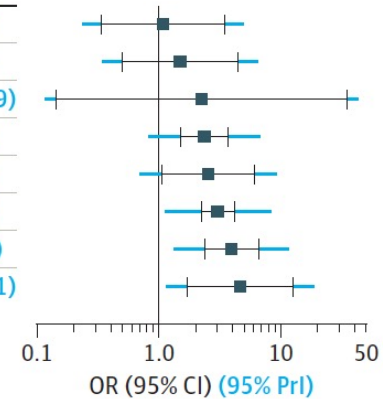
A Response

Active Device	OR (95% CI) (95% PrI)
sTMS	0.85 (0.22-3.35) (0.15-4.94)
aTMS	1.00 (0.02-62.31) (0.01-83.19)
dTMS	2.45 (0.74-8.07) (0.49-12.28)
LF-rTMS	2.70 (1.51-4.82) (0.82-8.89)
HF-rTMS	2.73 (1.78-4.20) (0.89-8.40)
TBS	3.37 (0.52-22.05) (0.37-30.69)
Bilateral rTMS	4.22 (1.96-9.05) (1.15-15.47)
pTMS	4.37 (1.10-17.47) (0.74-25.69)



B Remission

Active Device	OR (95% CI) (95% PrI)
sTMS	1.08 (0.34-3.49) (0.24-4.98)
dTMS	1.49 (0.50-4.47) (0.34-6.48)
aTMS	2.25 (0.14-35.03) (0.12-43.39)
LF-rTMS	2.37 (1.52-3.68) (0.83-6.78)
TBS	2.54 (1.07-6.05) (0.70-9.32)
HF-rTMS	3.07 (2.24-4.21) (1.12-8.37)
Bilateral rTMS	3.96 (2.37-6.60) (1.34-11.70)
pTMS	4.66 (1.70-12.77) (1.15-18.91)



aTMS indicates accelerated TMS; dTMS, "deep" (H-coil) TMS; HF, high frequency; LF, low frequency; pTMS, priming TMS; sTMS, synchronized TMS; TBS, θ -burst stimulation.