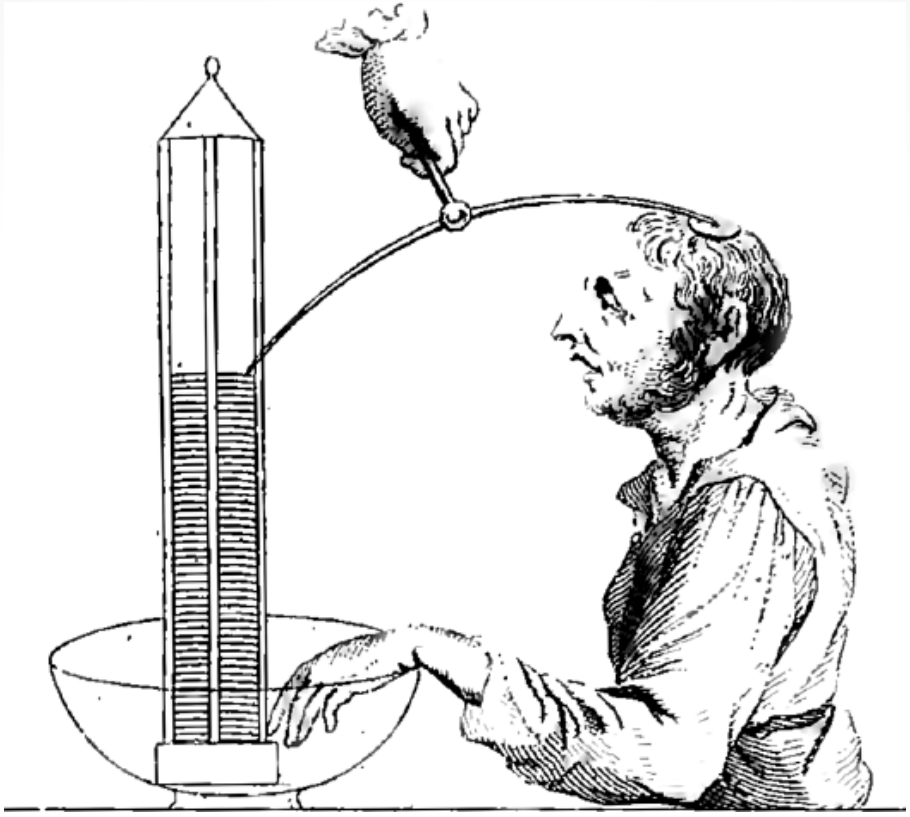
EMT
protocolos

ABECer

ASSOCIAÇÃO BRASILEIRA DE ESTIMULAÇÃO CEREBRAL

Intervenções

- Tipos de Estímulos moduladores de funcionamento psíquico/mental:
  - Não-invasivos: Magnético (EMT), elétrico (tDCS, EV, ETG)
  - Mínimamente invasivos: Elétrica (ECT,) Farmacológica (Infusões)
  - Invasivos: Estímulo elétrico profundo (DBS) e periférico(EV, ETG).
- FUTURO:
  - Protocolos
  - Intervenção à distância
  - Novos Parâmetros: frequência, potência, largura, ambiente, estímulo-repouso, Intervenção "inteligente" auto-evocada: bomba de infusão, wearables, intervenção durante tarefa, modulação de comportamento ou estado mental



. . . in these maladies, the brain, being particularly affected, may probably, by this means, be re-established in the regular use of its functions. (Aldini 1819, p. 65)

. . nestas doenças, o cérebro, sendo particularmente afetado, pode, provavelmente, através deste, ser restabelecida na utilização regular das suas funções

Primeiro aparelho de estimulação magnética transcraniana Barker (1985)

Descrição dos diferentes métodos

Psiquiatria Intervencionista

ECNI: Não-Invasiva rTMS, ETCNV, ETCC, ETCA, ETTG, Nasal-OCT

ECMI Mínimamente invasiva: ECT, Infusão Venosa (KT, NPS)

ECI: Invasiva: DBS/ECP, EVG/VNS

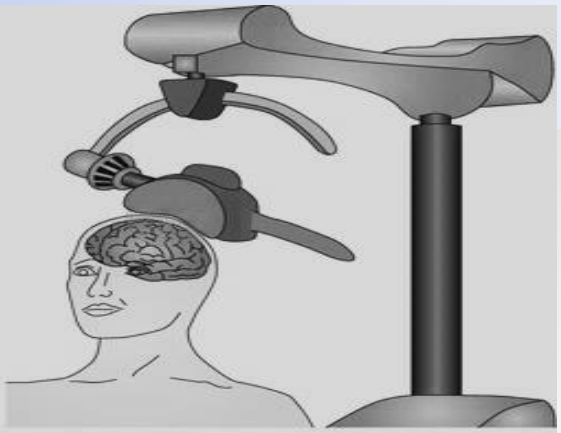
Técnicas contemporâneas de Modulação cerebral

- Implantes: estimulação elétrica direta
  - Epidural, subdural, Cortical
- Estimulação cerebral profunda.
- Estimulação Magnética Transcraniana
- Estimulação micromagnética
- Ultra-som.
- Neuromodulação optogenética:
  - entrega segura e integração de opsinas para o tecido-alvo, aumento da sensibilidade de opsinas para estimulação de baixa potência Jeong , 2015.

Métodos de Neuromodulação

ECT (1930s)
Induction of a seizure by administration of an electric current to the brain via electrodes placed on the scalp. The exact mechanism of action is unknown, but theories include correction of depletion of inhibitory neurotransmitters, and induction of neurogenesis, particularly in the hippocampus.

tDCS (1960s)
Application of a weak electric current to the scalp via two surface electrodes (anode and cathode). tDCS alters neuronal excitability by shifting the membrane potential of superficial neurons in a depolarizing or hyperpolarizing direction. The effect generally lasts for up to 1 h following a single period of stimulation.



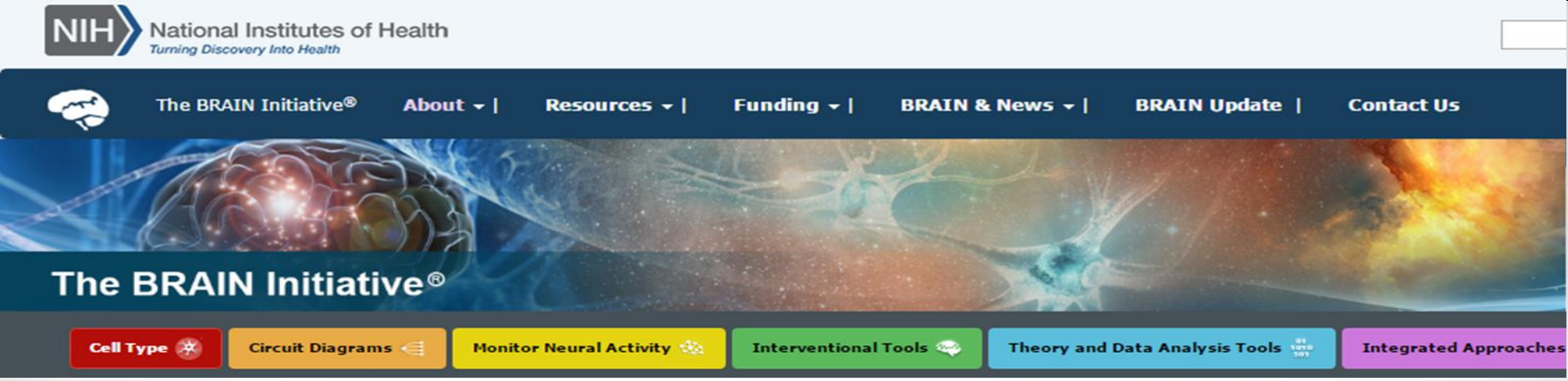
TMS (1990s)
Use of a time-variable, intense (~2T), focused magnetic field to induce an electrical field in superficial regions of the cortex. Magnetic field induction causes depolarization or firing of nerve cells in the brain. If repetitive trains of pulses are applied, the repeated firing of neurons over time seems to change their activity.

DBS (2005)
Direct implantation of electrodes into localized brain regions with the aim of altering both local and connected brain activity via ongoing, generally high-frequency stimulation. Electrodes are connected to a pacemaker implanted under the skin on the chest.

EpCS (2007)
A direct cortical stimulation technique that uses implanted electrodes placed above the dura at the desired brain region. Underlying neurons are activated through induction of an electrical field.

100 Hz MST (2008)
Induction of a focal seizure via high-frequency repetitive TMS. The seizure originates in the superficial regions of the cortex and, unlike in ECT, no electric current passes through the deeper regions of the brain. The mechanisms of action are as yet unknown.

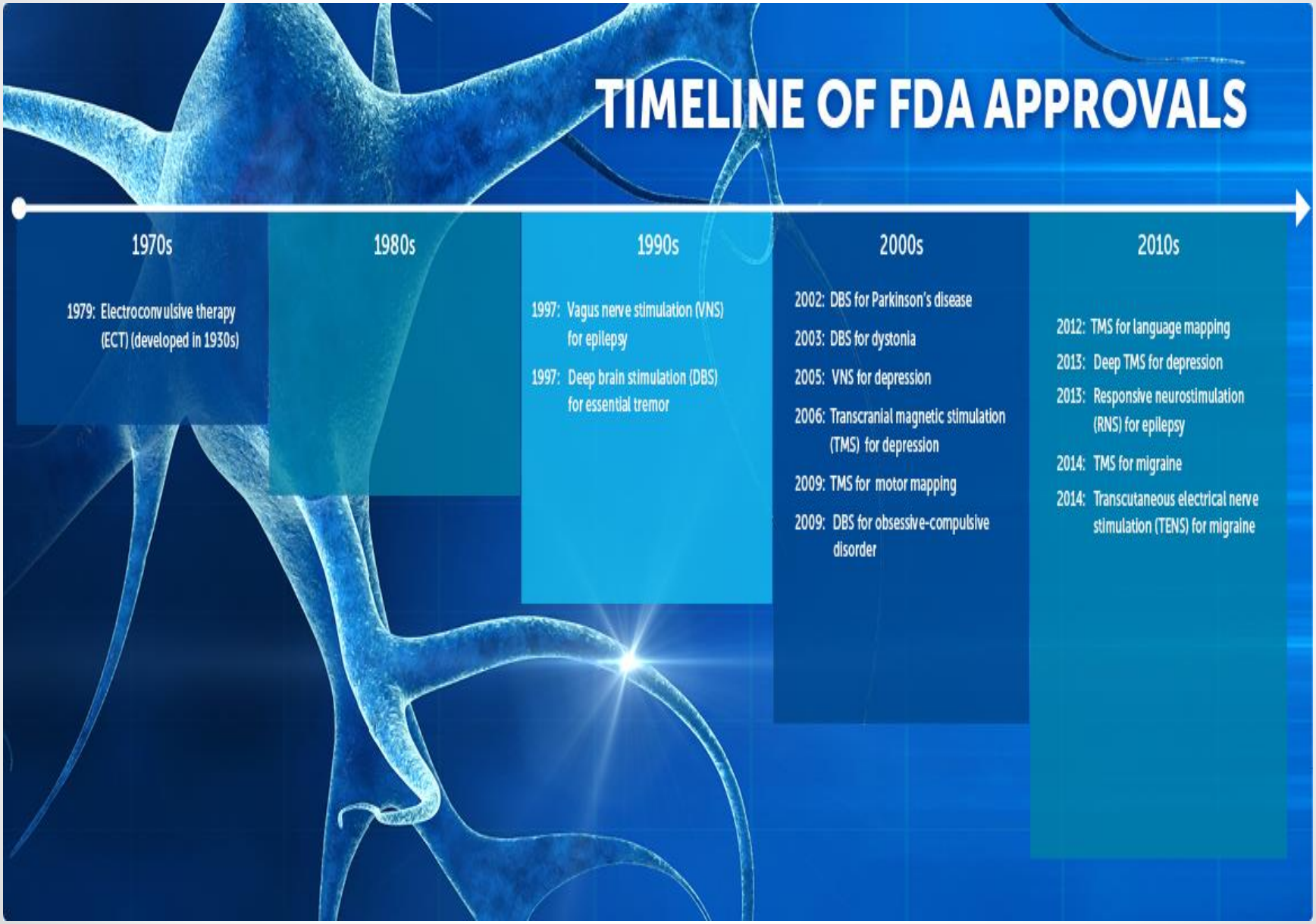
nature REVIEWS NEUROLOGY

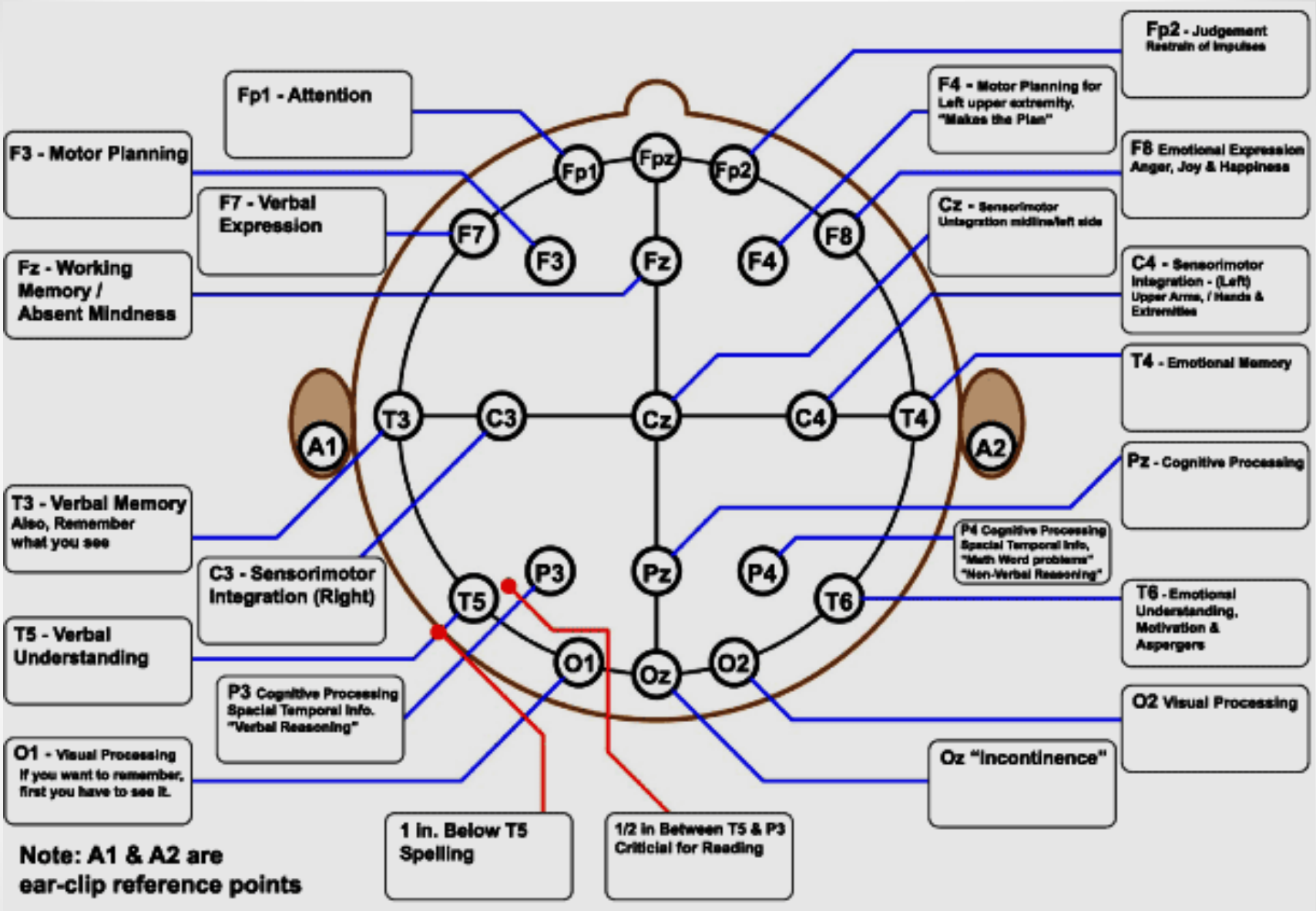


Desenvolver:

- Ferramentas para Manipulação de Circuitos por optogenética , farmacogenética, bioquímica, eletromagnética e/ou modulação acústica
- Manipulação de atividade neural de múltiplas regiões cerebrais - cortical, sub cortical e profunda.
- Plataformas multifuncionais para registro e integração com estimulação elétrica, óptica, química, fluida ou por RM alto campo.
- Gravação e manipulação de atividade neural durante comportamento
- Transformação de sinais neurais em sistemas modificadores
- de circuitos neurais subjacentes ao comportamento

Linha do tempo da modulação cerebral

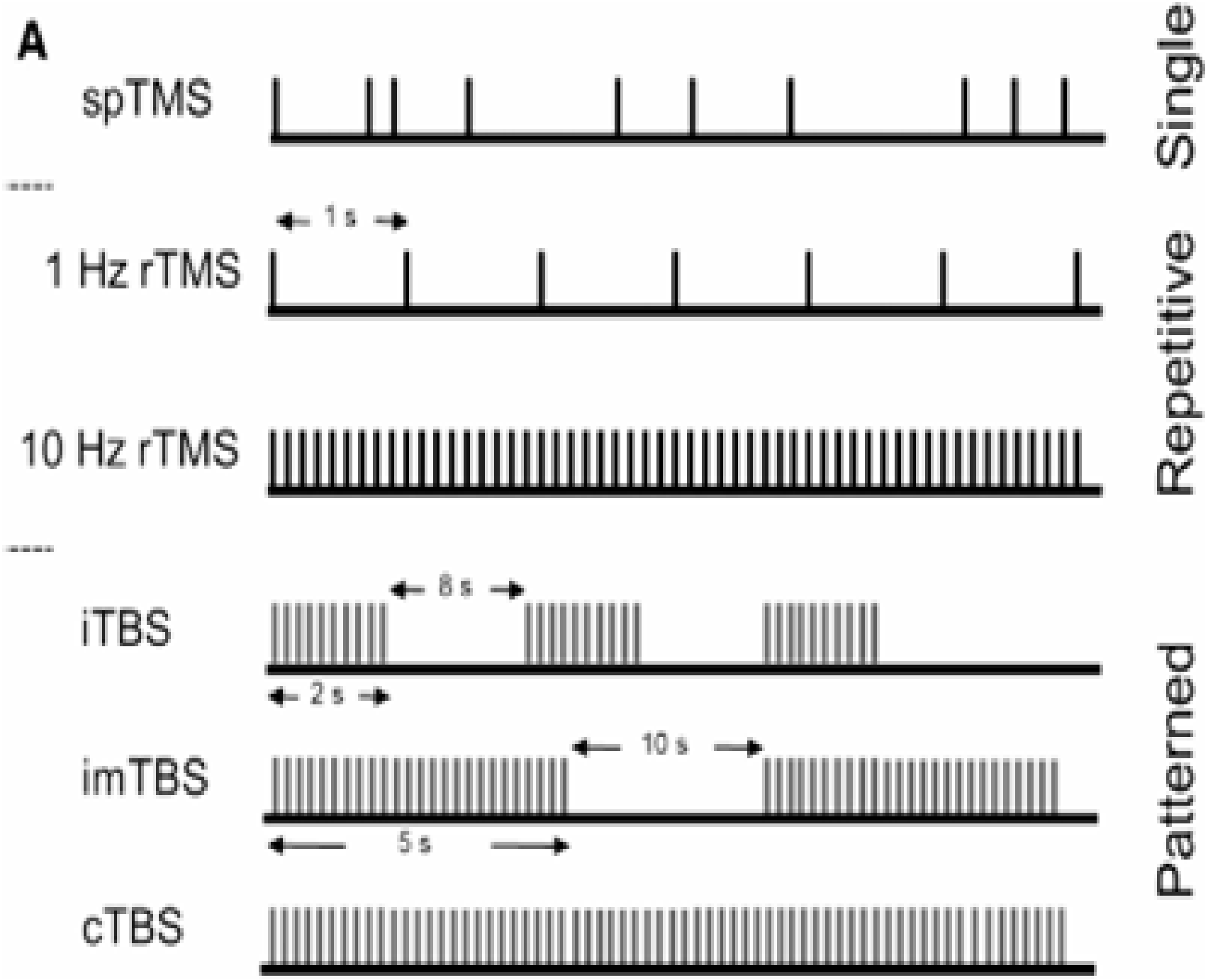




Definição de Áreas de Estimulação Cerebral

Princípios básicos da Modulação cerebral

- Repetição provoca ajuste persistente
- Determinantes da Persistência:
  - Forma de energia
    - elétrica, magnética, sônica, ótica, eletromagnética.
    - Região de estímulo
  - Parâmetros:
    - Intensidade,
    - Frequência,
    - Duração,
    - Intervalo.
    - Dose total (ex: 3.000 pulsos)
    - Estado


A
spTMS
1 s
1 Hz rTMS
10 Hz rTMS
8 s
iTBS
2 s
10 s
imTBS
5 s
cTBS
Single
Repetitive
Patterned

MY TMS JOURNEY

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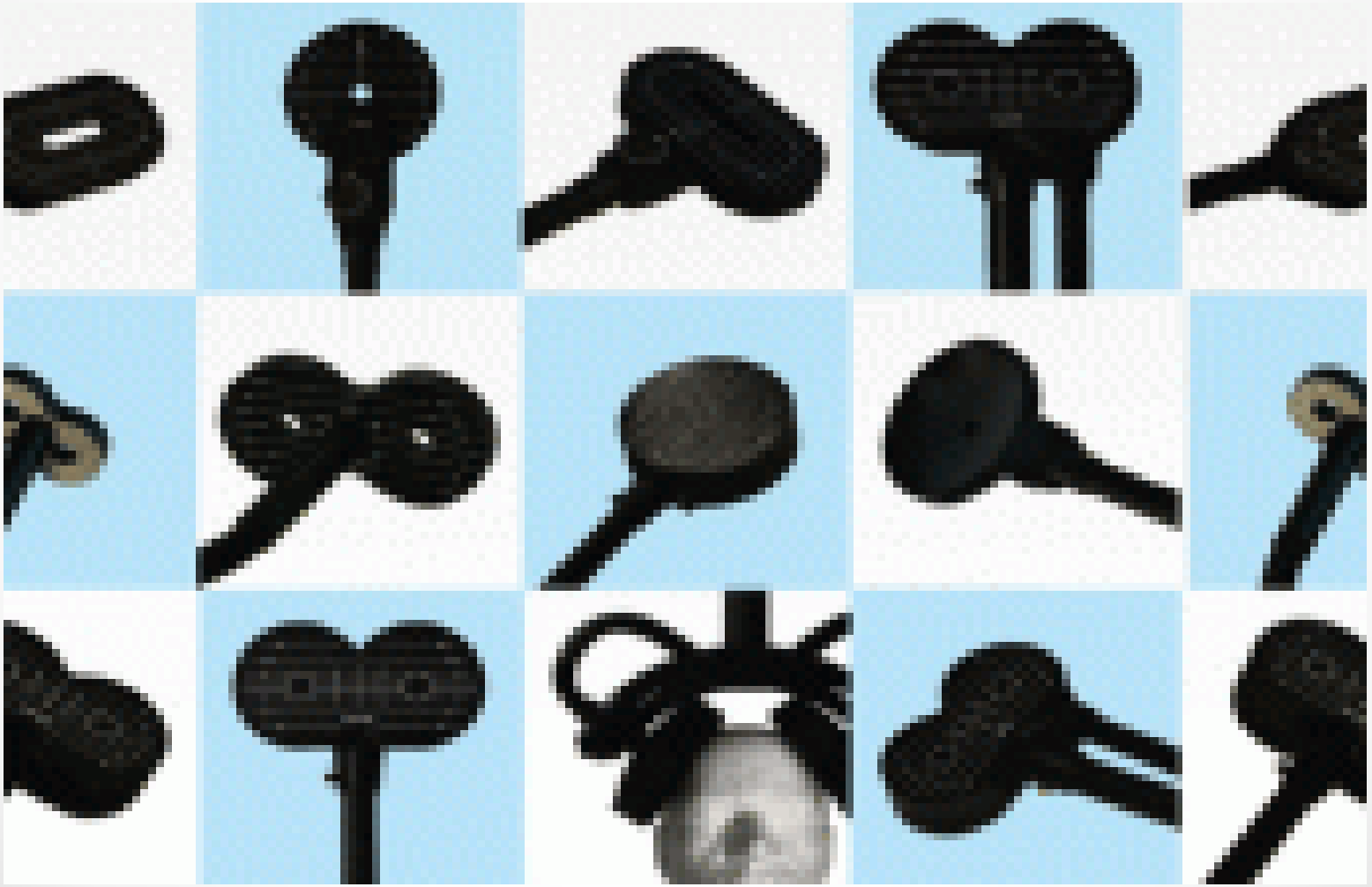
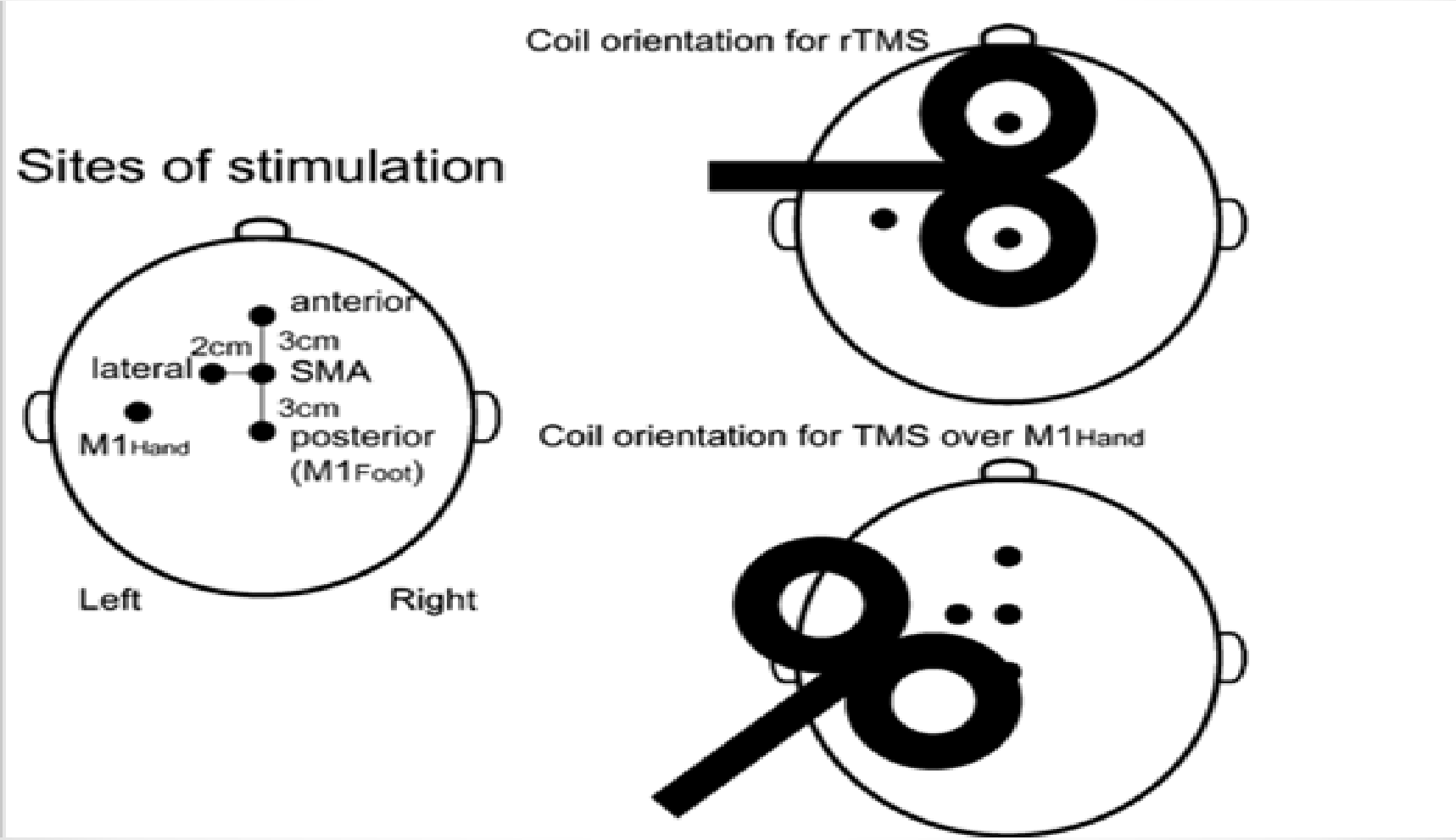
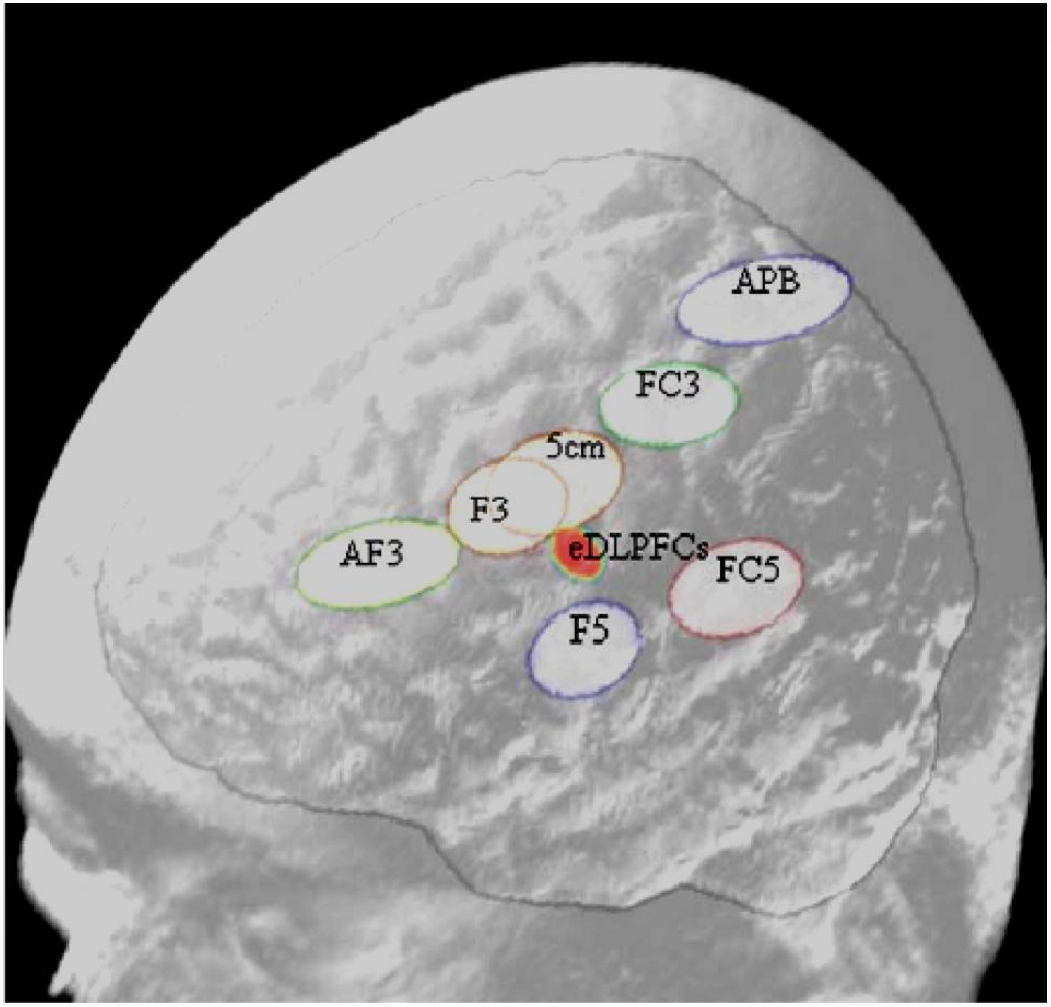
Estimulação Magnética: Bobinas



Estimulação Magnética: Protocolos



Localização ideal da bobina em CPFDLE Daskalakis, 2010

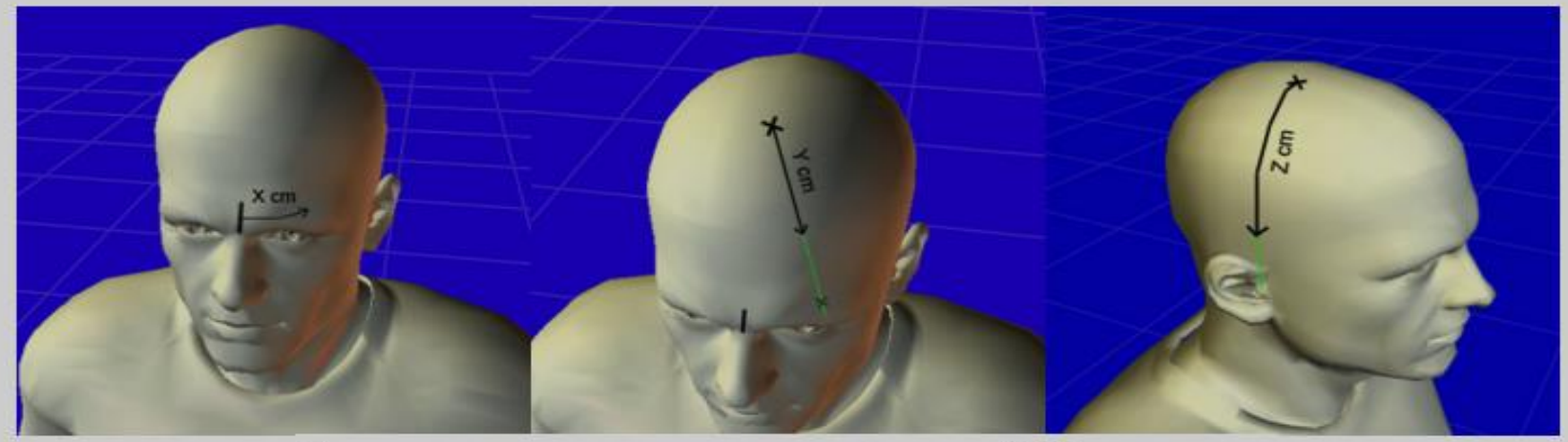


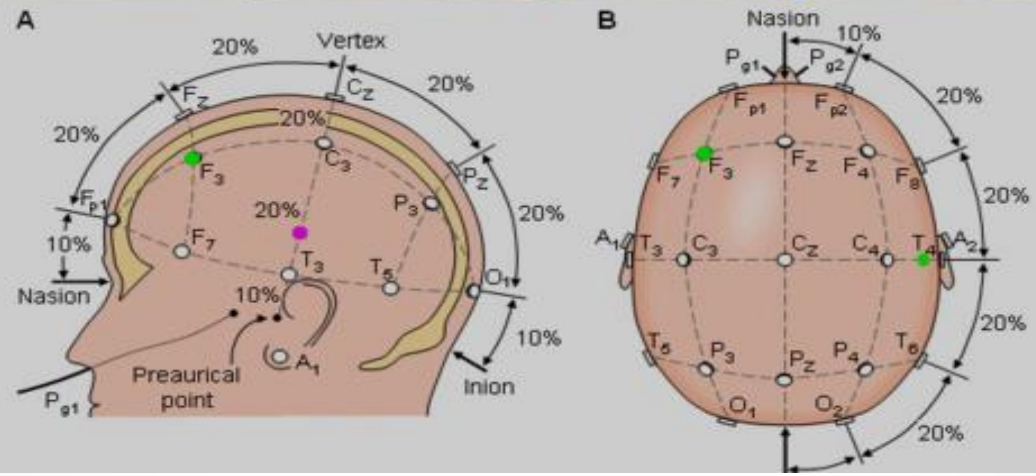
BA9 BA8 BA42 Location System

Will Beam & Jeff Borckardt

Web Interface Developed 6/7/2010

(F3) Distance along circumference from midline (X):	(F3) Distance from vertex (Y):	(BA43) Distance from vertex through tragus (Z):
0.00 cm	**0.00 cm**	**0.00 cm**





PARÂMETROS

FREQUÊNCIA

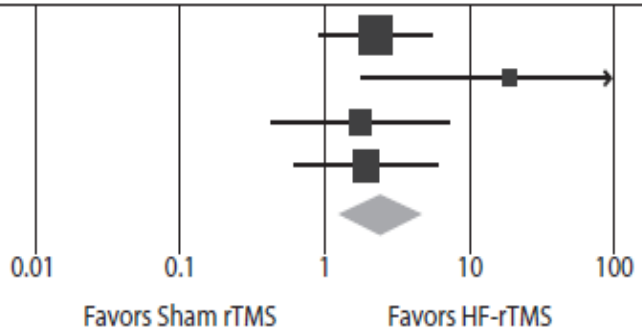
META-ANALYSIS

High-Frequency Repetitive Transcranial Magnetic Stimulation Accelerates and Enhances the Clinical Response to Antidepressants in Major Depression: A Meta-Analysis of Randomized, Double-Blind, and Sham-Controlled Trials

Marcelo T. Berlim, MD, MSc; Frederique Van den Eynde, MD, PhD; and Z. Jeff Daskalakis, MD, PhD

Figure 4. Meta-Analysis of High-Frequency rTMS (HF-rTMS) Versus Sham rTMS as Add-On to Antidepressants in Major Depression: Remission Rates at the End of Study

Study	Odds Ratio	95% CI Lower Limit	95% CI Upper Limit	*Z* Value	*P* Value	Remitters/Total, n/n Active HF-rTMS	Remitters/Total, n/n Sham rTMS	Relative Weight
Rossini et al[48]	2.292	0.943	5.570	1.830	.067	33/45	24/44	45.06
Rumi et al[49]	19.250	1.768	209.546	2.428	.015	7/11	1/12	7.10
Bretlau et al[51]	1.781	0.427	7.438	0.792	.429	6/22	4/23	19.04
Huang et al[52]	1.941	0.619	6.089	1.137	.255	11/28	7/28	28.80
	2.422	1.273	4.608	2.695	.007	57/106	36/107	



Abbreviation: rTMS = repetitive transcranial magnetic stimulation.

Jcp 2013

DISTÂNCIA BOBINA - CORTEX

AJUSTE

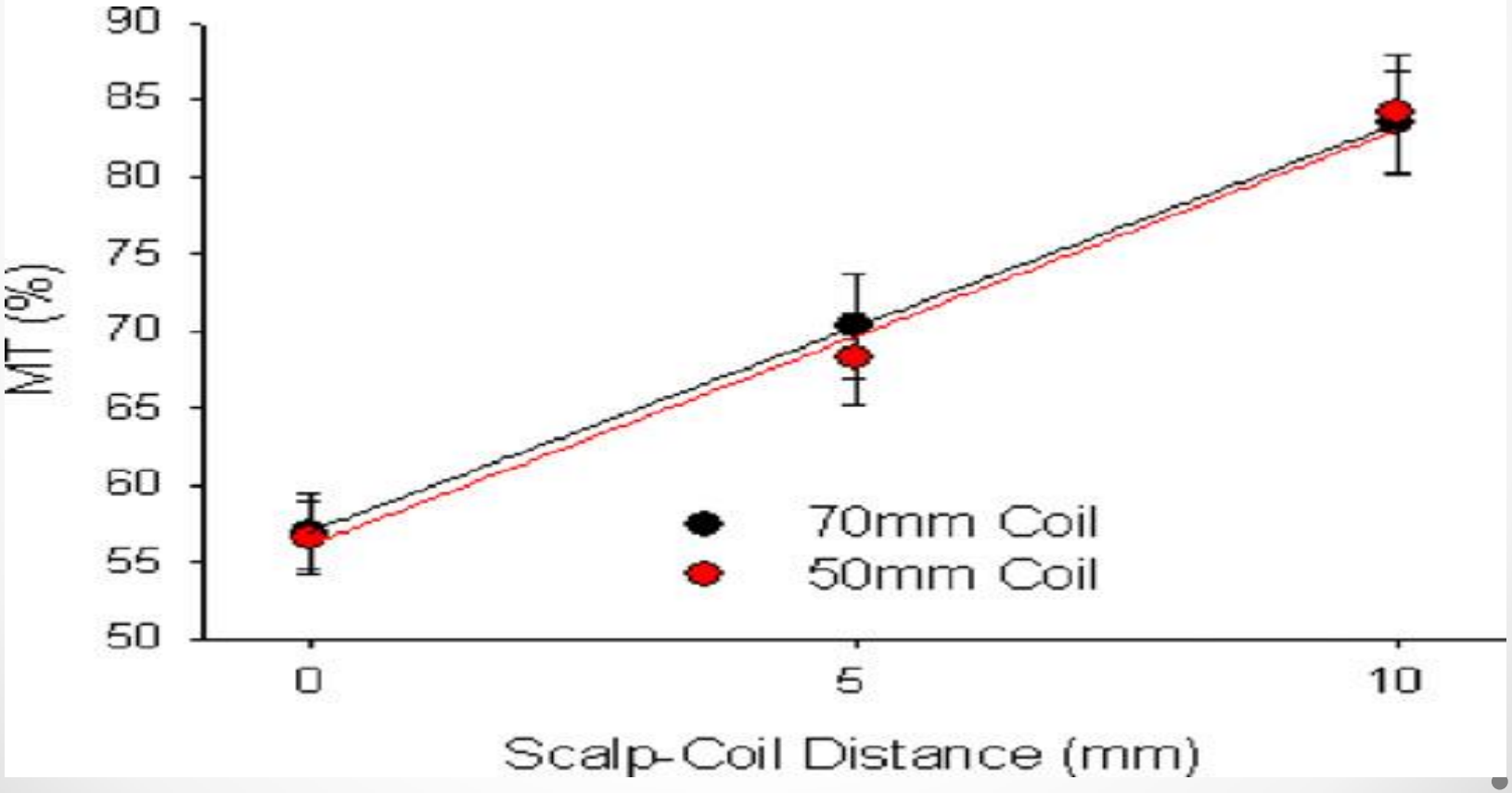
ELSEVIER

Clinical Neurophysiology 118 (2007) 1617–1625

www.elsevier.com/locate/clinph

Distance-adjusted motor threshold for transcranial magnetic stimulation

Mark G. Stokes [a,c,*], Christopher D. Chambers [b,c], Ian C. Gould [c], Therese English [c], Elizabeth McNaught [c], Odette McDonald [c], Jason B. Mattingley [c]

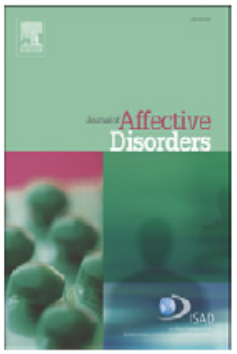


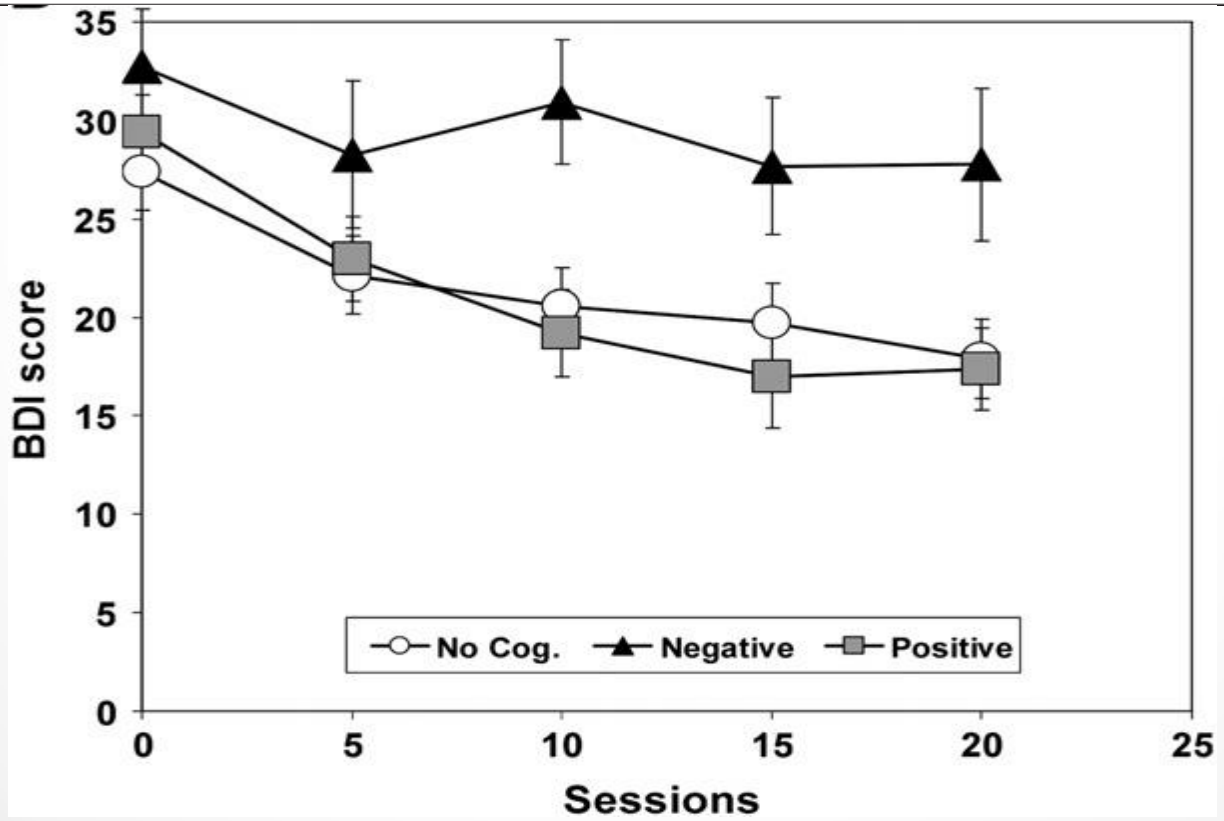
ATIVAÇÃO

Journal of Affective Disorders 128 (2011) 235–242

Cognitive–emotional reactivation during deep transcranial magnetic stimulation over the prefrontal cortex of depressive patients affects antidepressant outcome

Moshe Isserles [a], Oded Rosenberg [c], Pinchas Dannon [c], Yechiel Levkovitz [d], Moshe Kotler [c], Frederic Deutsch [e], Bernard Lerer [a], Abraham Zangen [b,*]





frontiers in
HUMAN NEUROSCIENCE

HYPOTHESIS AND THEORY ARTICLE
published: 26 February 2013
doi: 10.3389/fnhum.2013.00037

The relationship between brain oscillatory activity and therapeutic effectiveness of transcranial magnetic stimulation in the treatment of major depressive disorder

Andrew F. Leuchter[1]*, *Ian A. Cook*[1], *Yi Jin*[2,3] and *Bill Phillips*[2]

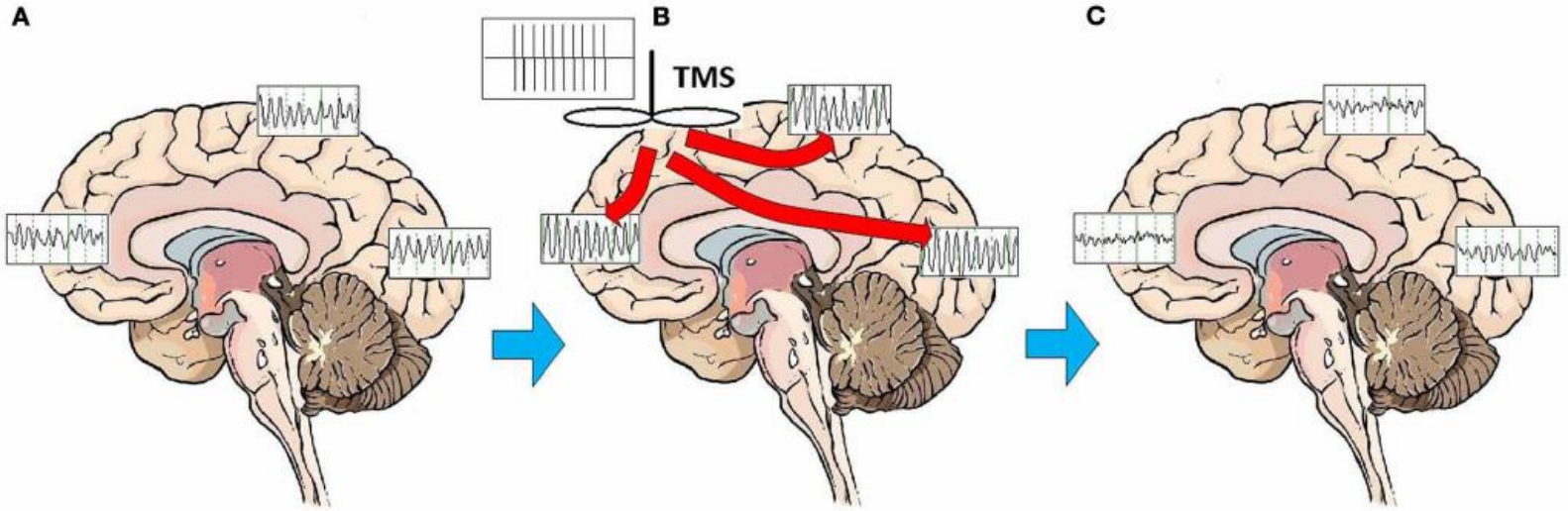


FIGURE 1 | Effects of rTMS stimulation on brain function. On average, patients with MDD exhibit a broad pattern of highly synchronous theta and alpha activity over most brain regions **(A)**. rTMS administered as a train of high amplitude pulses at a frequency of 10 Hz entrains brain oscillatory activity to the frequency of stimulation, for the duration of the stimulation period **(B)**. Multiple treatments over time may have the effect of resetting cortical oscillators. Once oscillators are reset, regionally-specific endogenous rhythms of the brain may reemerge. These consist of beta and gamma activity in the frontal cortex, beta in the parietal cortex, and alpha in the occipital cortex **(C)**.

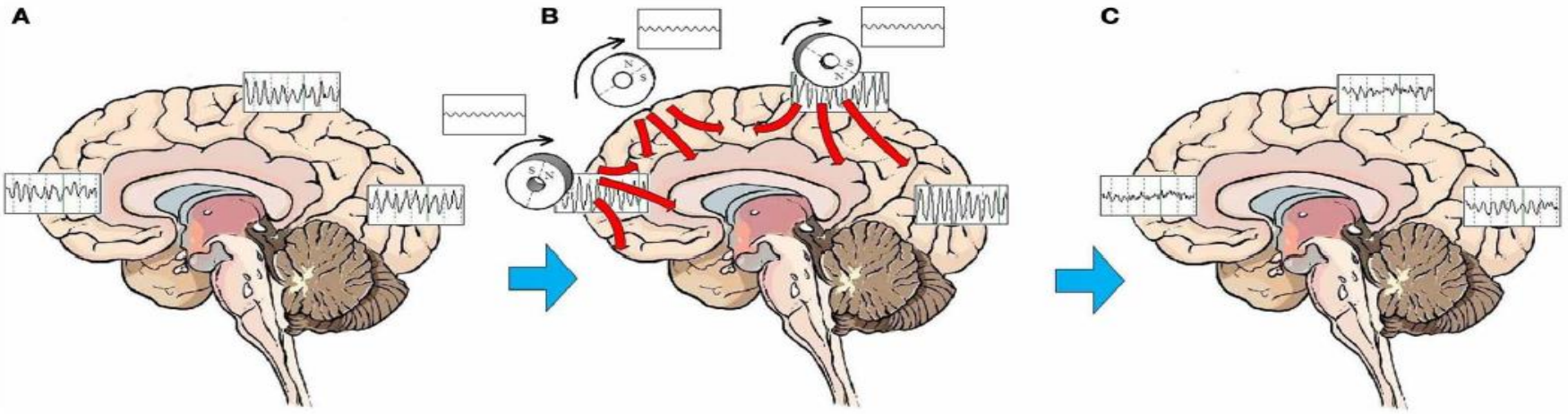


FIGURE 2 | Effects of sTMS stimulation on brain function. On average, patients with MDD exhibit a pattern of highly synchronous theta and alpha activity seen broadly over most brain regions **(A)**. The low-amplitude sinusoidal stimulation provided by the neodymium magnets rotating at the IAF entrains brain oscillatory activity to the frequency of stimulation for the duration of the stimulation period **(B)**. Like the high amplitude pulses of rTMS, multiple treatments of subthreshold sinusoidal stimulation may have the effect of resetting cortical oscillators. Once oscillators are reset, regionally-specific endogenous rhythms of the brain may reemerge. These consist of beta and gamma activity in the frontal cortex, beta in the parietal cortex, and alpha in the occipital cortex **(C)**.

Table 1 rTMS protocols applied on right dorsolateral prefrontal cortex (RDLPFC)

Study	Study design	Stimulation site/F (Hz)/Int.(%MT)	No. of sham patients	No. of active patients	No. of Sess./Sess. per week	Total pulses	Assessment	Outcome
Klein et al. 1999	DB placebo-controlled	RDLPFC/1/%110	32	35	10/5	1200	HDRS 17-item[a] MADRS[b]	A significant difference in response[c] between two groups
Lisanby et al. 2001	DB comparing active 10 (Hz) LDLPFC rTMS vs. active 1 (Hz) RDLPFC rTMS vs. sham LDLPFC rTMS	RDLPFC/1/%110	12	12	10/5	16,000	HDRS	Mean %reduction [d]HRSD: 20 % in active group vs. Mean % reduction HRSD: 13 % in sham group
Fitzgerald et al. 2003a, b	DB placebo-controlled	RDLPFC/1/100 %	20	20	10–20/5 After two weeks if the participant did not respond, more two weeks stimulation	3000–6000	MADRS	A significant difference in response between two groups
Höppner et al. 2003	Comparing active 20 (Hz) LDLPFC vs. active 1 (Hz) RDLPFC vs. sham LDLPFC rTMS	RDLPFC/1/%110	10	10	10/5	1200	HDRS MADRS BDI[e]	A significant pre- to post-treatment difference in response, no significant inter-group difference in response between $P = .025$
Kauffmann et al. 2004	DB, placebo-controlled	RDLPFC/1 %110	5	7	10/5	1200	N.A[f]	No significant difference in response between two groups $P = 0.56$
Isenberg et al. 2005	DB, randomized, parallel group, comparing active 20 (Hz) LDLPFC rTMS vs. active 1 (Hz) RDLPFC rTMS	RDLPFC/1/%110	NA	14	20/5	1200	HDRS BAI	Response rate: 32 %
Januel et al. 2006	DB sham controlled	RDLPFC/1/%90	16	11	16/4	1920	HDRS	A significant difference in response between two groups $P = 0.032$
Stern et al. 2007	DB, randomized, parallel group, sham- controlled trial	RDLPFC/1 %110	15	10	10/5	16,000	N.A	A significant difference in response between two groups $P = 0.028$
Pallanti et al. 2010	DB, randomized	RDLPFC/1/%110	20	20	15/5	6300	HDRS	significant difference in response between two groups
Aguirre et al. 2011	Randomized, controlled, two arm, clinical trial.	RDLPFC/1/%110	15	15	20/5	24,000	HDRS	Both treatment groups significantly improved, but no statistical differences
Eche et al. 2012	Single blind randomized comparing active 10 (Hz) LPF rTMS vs. active 1 (Hz) RDLPFC	RDLPFC/1/%100	–	8	20/5	1200	MADRS	Post-treatment 50 % antidepressant effect

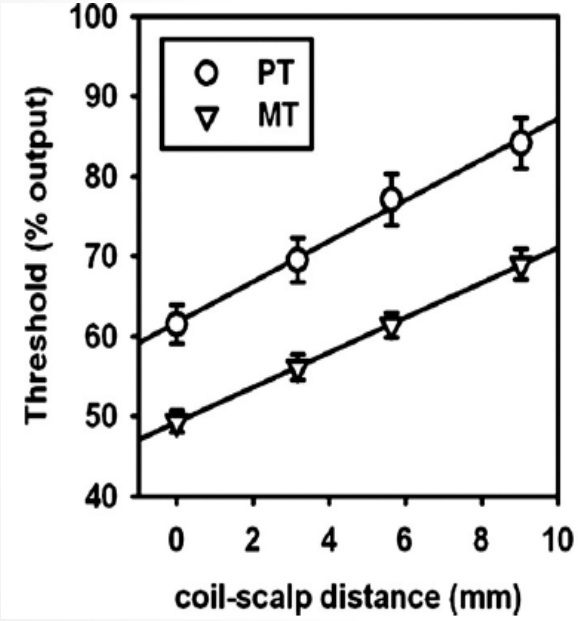
Int J Ment Health Addiction (2016) 14:539–549

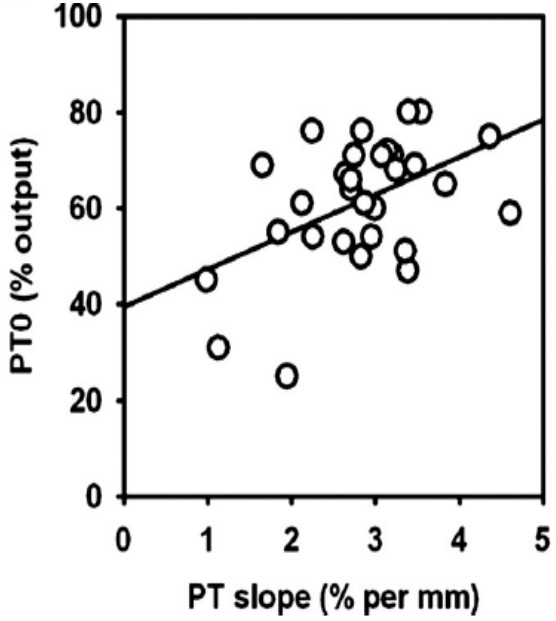
The most widely used site of stimulation for depression treatment is left and right DLPFC with corresponding 10 and 1 Hz stimulation. The neurophysiological effects of low frequency rTMS are significantly different from the high frequency stimulation. Low frequency rTMS modulates frontal alpha power asymmetry, whereas high frequency protocols influence more broader regions and wider electrophysiological characteristics of the brain

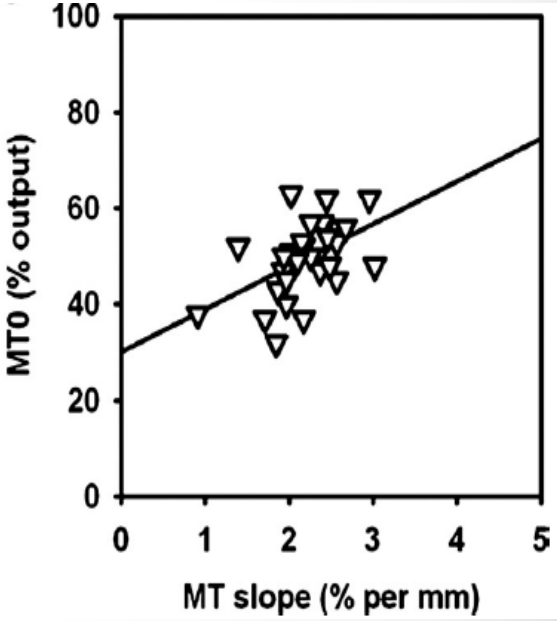
J Neurophysiol 109: 437–444, 2013.
First published October 31, 2012; doi:10.1152/jn.00510.2012.

Biophysical determinants of transcranial magnetic stimulation: effects of excitability and depth of targeted area

Mark G. Stokes,[1] Anthony T. Barker,[2] Martynas Dervinis,[3] Frederick Verbruggen,[4] Leah Maizey,[3] Rachel C. Adams,[3] and Christopher D. Chambers[3]





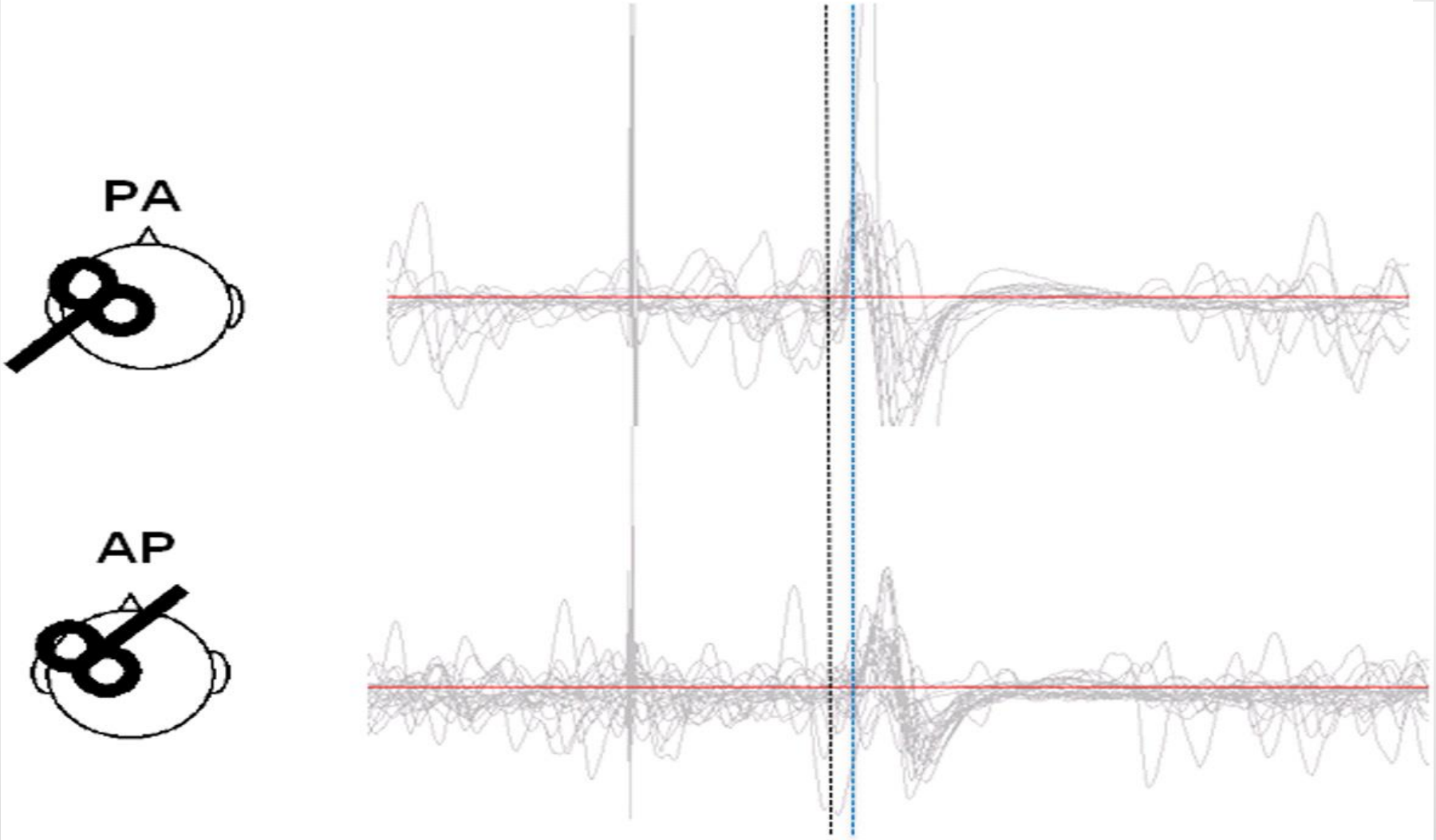


Orientação da bobina

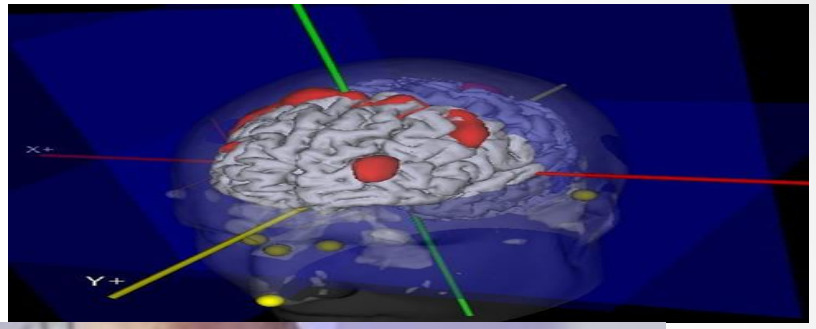
Clinical Neurophysiology 127 (2016) 675–683

Effect of coil orientation on strength–duration time constant and I-wave activation with controllable pulse parameter transcranial magnetic stimulation

Kevin D'Ostilio [a,b,1], Stefan M. Goetz [c,d,1], Ricci Hannah [a], Matteo Ciocca [a,e], Raffaella Chieffo [a,f], Jui-Cheng A. Chen [a,g,h], Angel V. Peterchev [c,i], John C. Rothwell [a,*]



Localização mais precisa: Integração Imagem - Aparelho



Uso de Realidade Virtual

Environment and Behavior
1–27

DOI: 10.1177/0013916517710077
journals.sagepub.com/home/eab

The Soothing Sea: A Virtual Coastal Walk Can Reduce Experienced and Recollected Pain

Karin Tanja-Dijkstra[1], Sabine Pahl[1], Mathew P. White[2], Melissa Auvray[3], Robert J. Stone[4], Jackie Andrade[1,5], Jon May[1,5], Ian Mills[1,3], and David R. Moles[1]

https://youtu.be/n5kjETt8cZI

Brain Stimulation 6 (2013) 231–240

Contents lists available at SciVerse ScienceDirect

Brain Stimulation

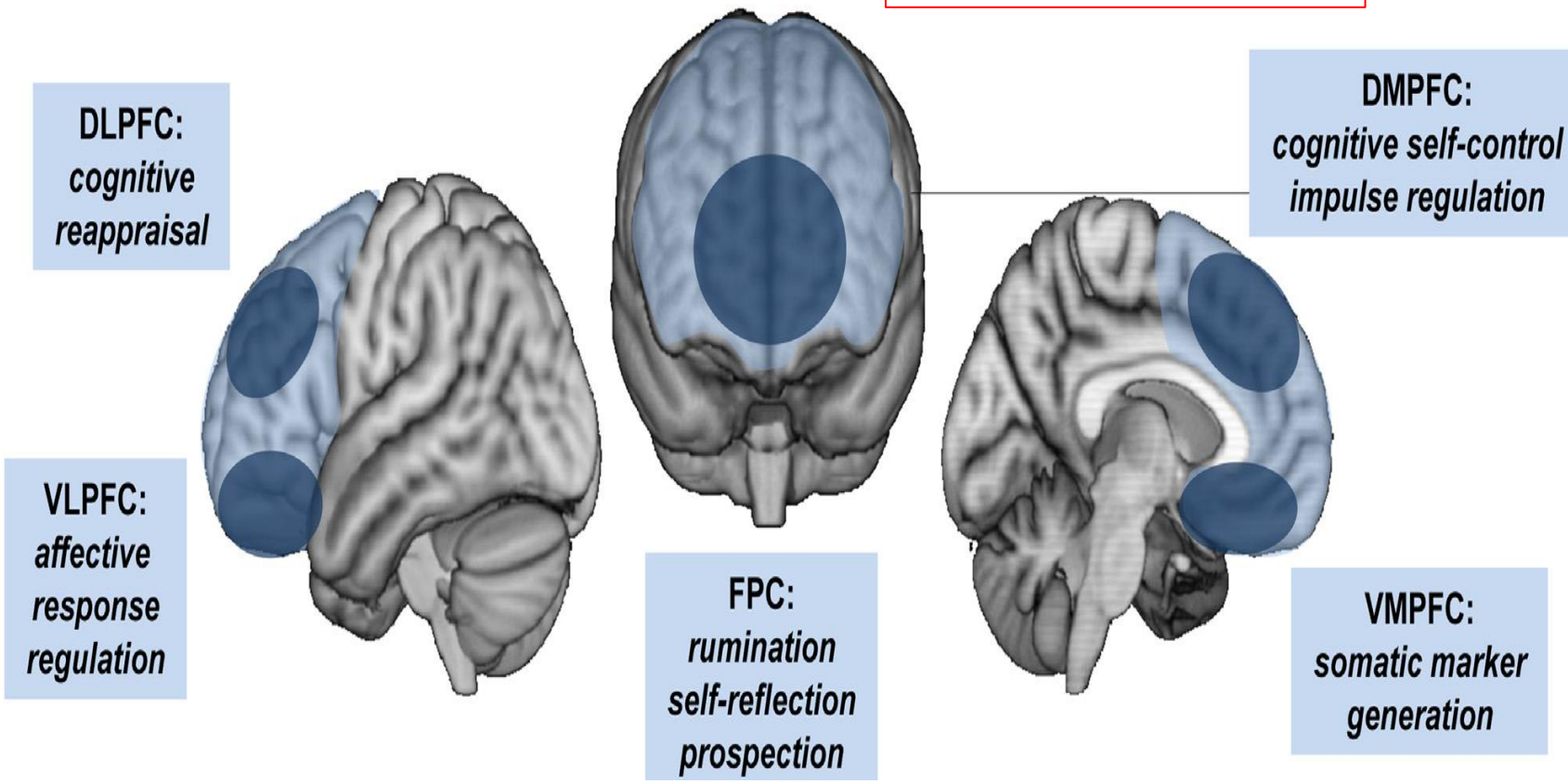
journal homepage: www.brainstimjrnl.com

New Targets for rTMS in Depression: A Review of Convergent Evidence

Jonathan Downar [a,b,*], Z. Jeff Daskalakis [a,c,1]

Novos Alvos

A



Brain Stimulation 6 (2013) 231–240

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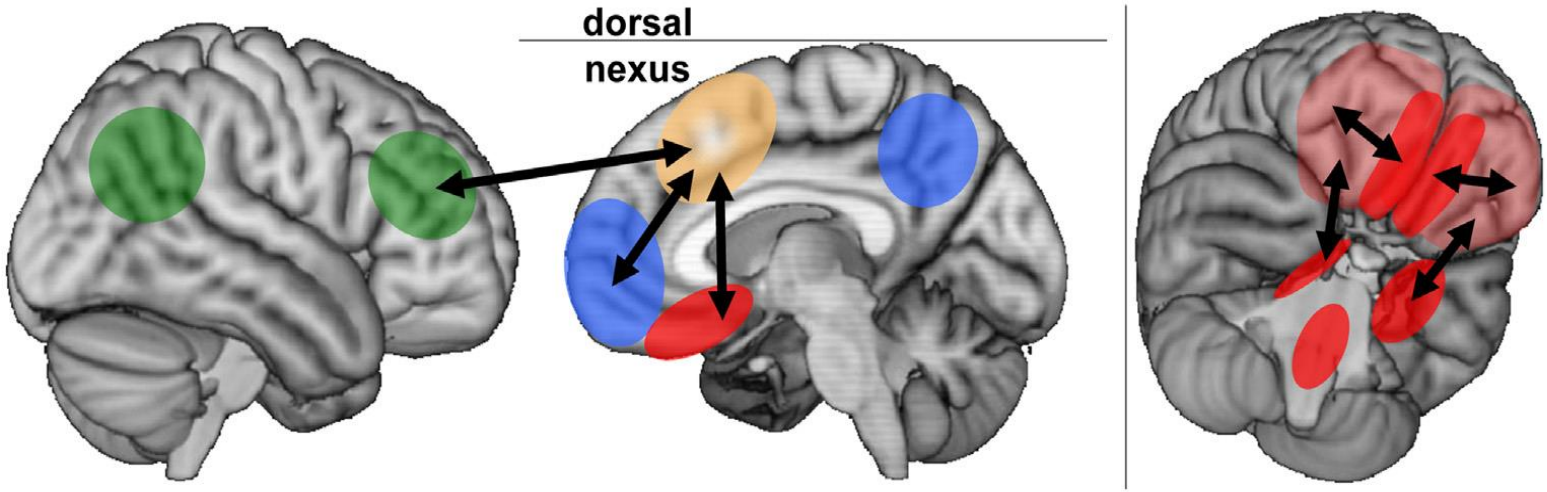
New Targets for rTMS in Depression: A Review of Convergent Evidence

Jonathan Downar [a,b,*], Z. Jeff Daskalakis [a,c,1]

B



abnormal connectivity in depression

Cognitive Control Network
attention, g-loaded tasks
decision-making

Default Mode Network
rumination
self-reflection

Affective Network
emotion regulation
somatic markers

Aceleração de resposta a Medicação

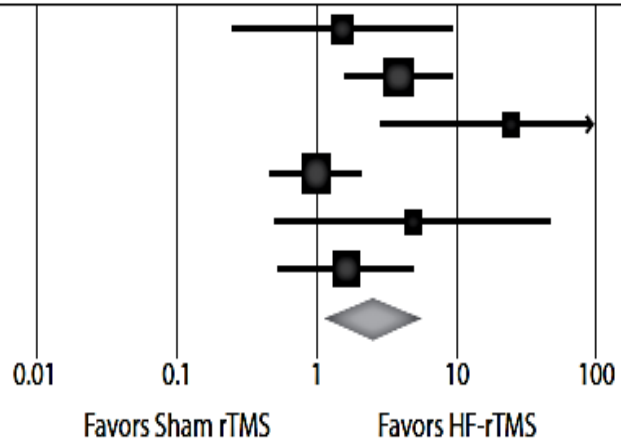
META-ANALYSIS

High-Frequency Repetitive Transcranial Magnetic Stimulation Accelerates and Enhances the Clinical Response to Antidepressants in Major Depression: A Meta-Analysis of Randomized, Double-Blind, and Sham-Controlled Trials

Marcelo T. Berlim, MD, MSc; Frederique Van den Eynde, MD, PhD; and Z. Jeff Daskalakis, MD, PhD

Figure 2. Meta-Analysis of High-Frequency rTMS (HF-rTMS) Versus Sham rTMS as Add-On to Antidepressants in Major Depression: Response Rates at the End of the rTMS Add-on Period

Study	Odds Ratio	95% CI Lower Limit	95% CI Upper Limit	*Z* Value	*P* Value	Active TMS	Sham rTMS	Relative Weight
Garcia-Toro et al[47]	1.524	0.250	9.295	0.457	.648	4/11	3/11	12.29
Rossini et al[48]	3.854	1.574	9.436	2.953	.003	25/49	10/47	23.39
Rumi et al[49]	24.818	2.860	215.377	2.913	.004	21/22	11/24	9.68
Herwig et al[50]	0.994	0.468	2.114	−0.015	.988	19/62	20/65	25.56
Bretlau et al[51]	4.889	0.501	47.708	1.365	.172	4/22	1/23	8.98
Huang et al[52]	1.618	0.529	4.942	0.844	.399	11/28	8/28	20.11
	2.499	1.123	5.559	2.245	.025	84/194	53/198	



Abbreviation: rTMS = repetitive transcranial magnetic stimulation.

Novos Desfechos

- Comportamento Repetitivo
- Processamento de informação
- Atenção
- Cognição/raciocínio
- Cognição Social/Empatia
- Solução de problemas complexos
- Aprendizado motor
- Aprendizado Verbal e Não-verbal
- Meta-memória
- Reparo – Regeneração de SNC

frontiers in
SYSTEMS NEUROSCIENCE

ORIGINAL RESEARCH ARTICLE
published: 06 August 2014
doi: 10.3389/fnsys.2014.00134

rTMS neuromodulation improves electrocortical functional measures of information processing and behavioral responses in autism

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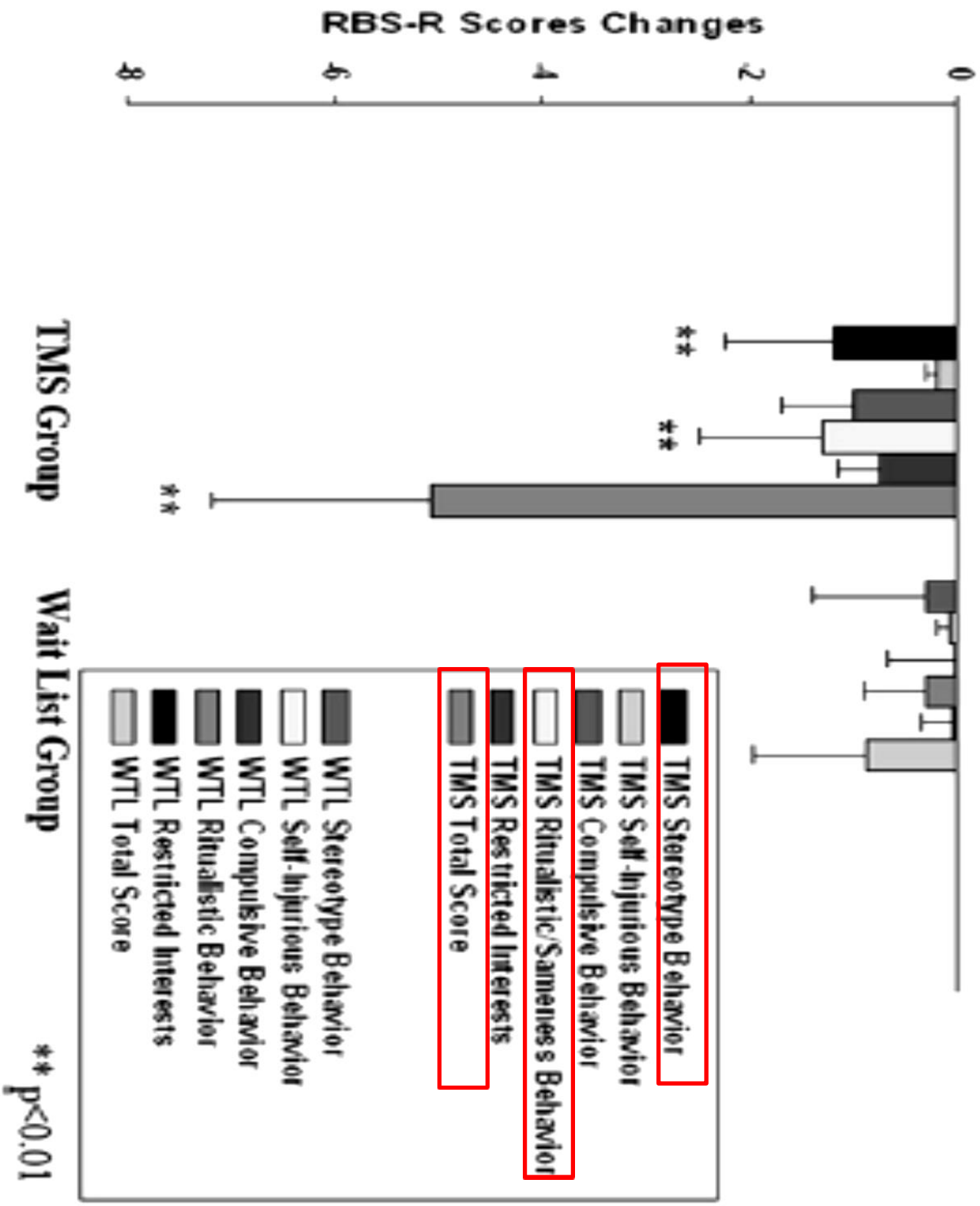


Meta-memória

Neuropsychologia 85 (2016) 74–79

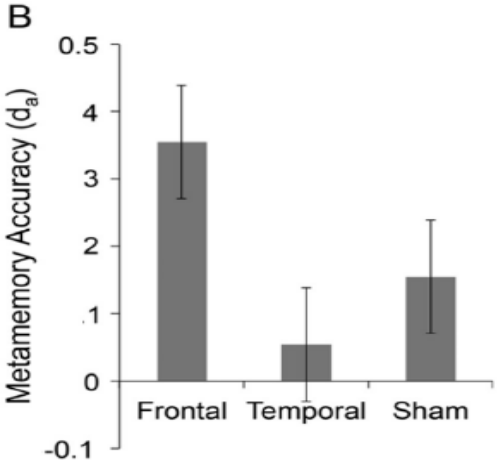
Contents lists available at ScienceDirect

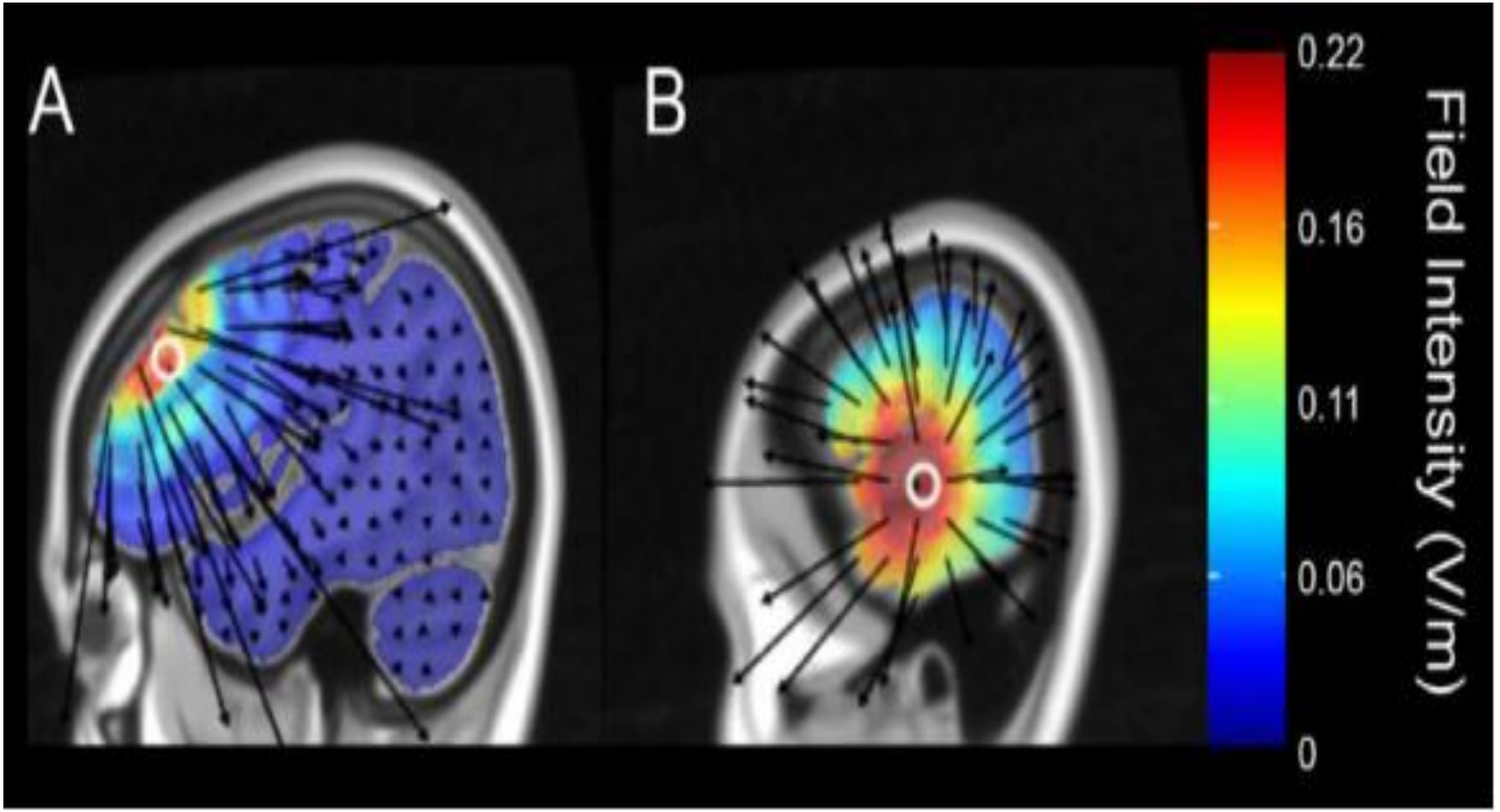
Neuropsychologia

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

Electrical stimulation of the dorsolateral prefrontal cortex improves memory monitoring

Elizabeth F. Chua [a,b,*], Rifat Ahmed [a]





Schizophrenia Research 165 (2015) 171–174

Contents lists available at ScienceDirect

Schizophrenia Research

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

The effect of transcranial direct current stimulation on social cognition in schizophrenia: A preliminary study

Yuri Rassovsky [a,b,*], Walter Dunn [c,b], Jonathan Wynn [c,b], Allan D. Wu [d], Marco Iacoboni [b,e], Gerhard Hellemann [b], Michael F. Green [b,c]

Performance data on measures of social cognition and overall neurocognition.

	Anodal (n = 12)		Cathodal (n = 12)		Sham (n = 12)		Statistic for interaction
	Baseline	Post-tDCS	Baseline	Post-tDCS	Baseline	Post-tDCS	
MSCEIT	33.0 ± 9.19	32.8 ± 12.4	32.7 ± 12.8	33.2 ± 10.5	36.3 ± 15.9	35.7 ± 14.8	F = 0.066
FEIT	44.8 ± 6.62	47.7 ± 5.71	45.4 ± 7.49	44.5 ± 8.51	47.8 ± 5.38	47.8 ± 6.15	F = 4.011 p = 0.028
PONS	79.4 ± 8.14	79.3 ± 9.00	75.3 ± 8.88	76.3 ± 8.76	79.8 ± 14.8	81.6 ± 11.3	p = 0.584
TASIT	48.0 ± 6.49	47.9 ± 4.91	43.8 ± 6.15	44.9 ± 4.80	46.0 ± 7.63	46.8 ± 7.96	F = 0.203 p = 0.817
MCCB	34.3 ± 16.9	35.7 ± 17.7	31.4 ± 10.0	34.4 ± 12.7	38.8 ± 14.5	39.0 ± 13.5	F = 1.143 p = 0.331

tDCS: transcranial direct current stimulation; MSCEIT: Mayer–Salovey–Caruso Emotional Intelligence Test; FEIT: Facial Emotion Identification Test; PONS: Profile of Nonverbal Sensitivity; TASIT: The Awareness of Social Inference Test; MCCB: MATRICS Consensus Cognitive Battery (Neurocognitive Composite score); shown are mean ± standard deviation; statistics shown are time (baseline, post-tDCS) by condition (anodal, cathodal, sham) interaction effects and their effect sizes.

Cognição Social

Solução de Problemas complexos

Neuroscience Letters 515 (2012) 121–124

Contents lists available at SciVerse ScienceDirect

Neuroscience Letters

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

Brain stimulation enables the solution of an inherently difficult problem

Richard P. Chi[a,b], Allan W. Snyder[a,b,*]

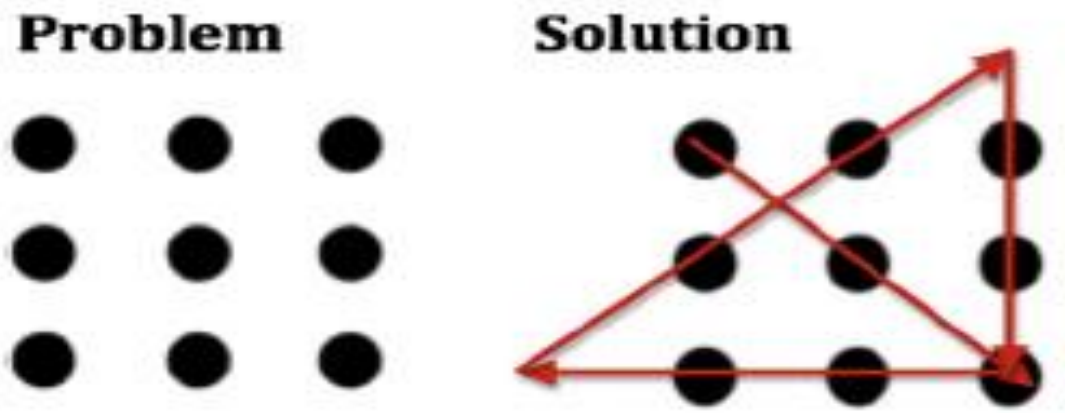


Fig. 1. The task is to connect all nine dots with four straight lines, drawn without lifting pen from paper or retracing a line. The majority of published studies show that no participants can solve this deceptively simple problem [16] – a fact we confirmed. But with 10 min of our stimulation protocol, more than 40% of healthy participants did so.

Cognição Social

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	Anodal (n = 12)		Cathodal (n = 12)		Sham (n = 12)		Statistic for interaction
	Baseline	Post-tDCS	Baseline	Post-tDCS	Baseline	Post-tDCS	
MSCEIT	33.0 ± 9.19	32.8 ± 12.4	32.7 ± 12.8	33.2 ± 10.5	36.3 ± 15.9	35.7 ± 14.8	F = 0.066 p = 0.936
FEIT	44.8 ± 6.62	47.7 ± 5.71	45.4 ± 7.49	44.5 ± 8.51	47.8 ± 5.38	47.8 ± 6.15	F = 4.011 p = 0.028
PONS	79.4 ± 8.14	79.3 ± 9.60	73.3 ± 8.88	76.3 ± 8.76	79.8 ± 14.8	81.6 ± 11.5	F = 0.546 p = 0.584
TASIT	48.0 ± 6.49	47.9 ± 4.91	43.8 ± 6.15	44.9 ± 4.80	46.0 ± 7.63	46.8 ± 7.96	F = 0.203 p = 0.817
MCCB	34.3 ± 16.9	35.7 ± 17.7	31.4 ± 10.0	34.4 ± 12.7	38.8 ± 14.5	39.0 ± 13.5	F = 1.143 p = 0.331

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Tipo de estímulos e Parâmetros Efeitos de Neuromodulação e Regeneração

Intervention	Parameters	Results
TMS	300 pulses, 10 Hz, 3 s 120% M	Increases the proliferation of adult NSCs
TMS	20 pulses, 200 Hz	Facilitates adult hippocampal neurogenesis and maturation
TMS	35 trains, 10 HZ, 120% M	Increases amygdala volume and may promotes neurogenesis
	31 trains, 1/10 Hz, 120% M	Increases Brdu-positive cells
TMS	4 trains, 25Hz, 10 s, 1000 pulses	Increases migratory activity of NSCs

Table 1 Comparison of devices for Treatment Resistant Depression (TRD). ECT : Electroconvulsive Therapy; TMS Transcranial Magnetic Stimulation; VNS : Vagal Nerve Stimulation, DBS; Deep Brain Stimulation

	ECT	TMS	VNS	DBS
FDA status	"Gold standard" in TRD	Approved for TRD after failure of one AD	Approved	Not approved – under investigation
Reimbursed by insurance	Yes	Few cases	No	No
Requires surgery/multidisciplinary team	General anesthesia	no	Yes	Yes
Acute clinical efficacy	yes	yes	No	no
Approximate costs (USD)	10-15,000 for 3-4 weeks	6-12,000 for 3-4 weeks	40-45,000 for surgery + device	200-250,000 for surgery + device
Follow-up adjustments / maintenance (per visit, USD)	200-800	200-400	350-620	350-620

Canadian Network for Mood and Anxiety Treatments (CANMAT) 2016 Clinical Guidelines for the Management of Adults with Major Depressive Disorder:Roumen V. Milev

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

Neurostimulation	Overall Recommendation	Acute Efficacy	Maintenance Efficacy	Safety and Tolerability
rTMS	First line (for patients who have failed at least 1 antidepressant)	Level 1	Level 3	Level 1
ECT	Second line First line in some clinical situations (see Table 5)	Level 1	Level 1	Level 1
tDCS	Third line	Level 2	Level 3	Level 2
VNS	Third line	Level 3	Level 2	Level 2
DBS	Investigational	Level 3	Level 3	Level 3
MST	Investigational	Level 3	Not known	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.

o que já está aprovado e o que vem por aí

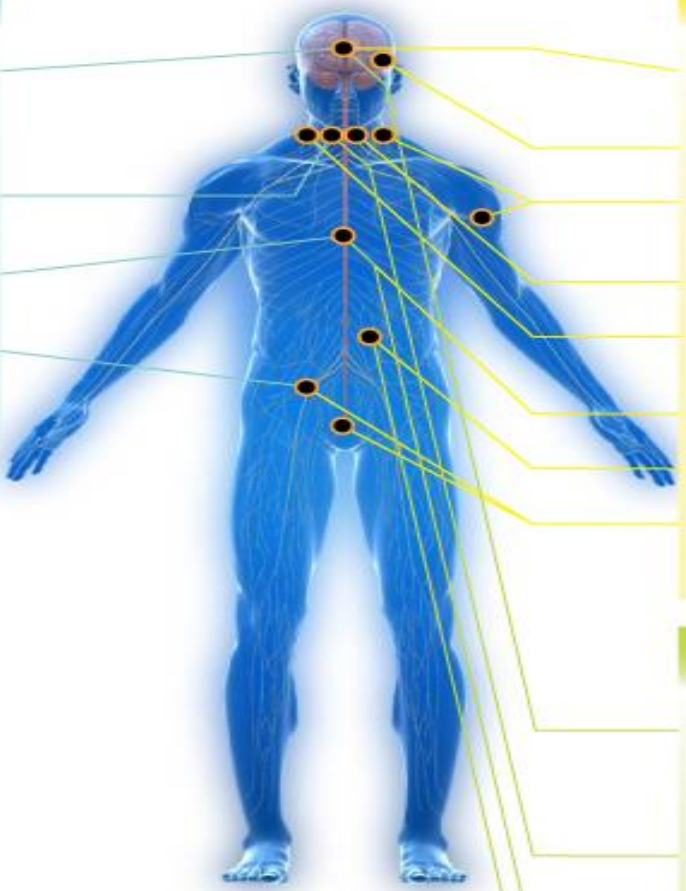
FDA APPROVED

Deep Brain Stim:
Parkinson's Disease, Dystonia, Essential Tremor, Depression, Epilepsy, Obsessive Compulsive Disorder

Vagus Nerve Stim:
Depression, Epilepsy

Spinal Cord Stim:
Pain

Sacral Nerve Stim:
Urinary Incontinence, Fecal Incontinence



EMERGING

Deep Brain Stim:
Obesity, Stroke Recovery

Cortical Stim: Epilepsy

Peripheral Nerve Stim:
Migraines, Extremity Pain

Carotid Artery, Sinus Stim: Hypertension

Hypoglossal & Phrenic Nerve Stim:
Sleep Apnea

Spinal Cord Stim: Angina

Gastric Stim: Obesity

Sacral & Pudendal Nerve Stim:
Interstitial Cystitis

FUTURE

Deep Brain Stim:
Alzheimer's, Anxiety, Bulimia, Tinnitus, Traumatic Brain Injury, Tourette's, Sleep Disorders, Autism, Bipolar

Vagus Nerve Stim:
Alzheimer's, Anxiety, Obesity, Bulimia, Tinnitus, Obsessive Compulsive Disorder, Heart Failure

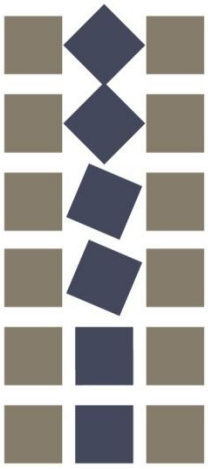
Spinal Cord Stim: Asthma

Gastric Stim: Bulimia, Interstitial Cystitis

Resumo

- Evidência já demonstrada.
- Novos equipamentos: diferentes bobinas, formatos, múltiplas bobinas,
- Novos alvos
- Novos desfechos
- Novos protocolos:
  - Locais, número, potência, localização, orientação, priming,
- Cuidados: Psiquiatria Cosmética – Estética

- Contato: pbabreu@gmail.com
- Web: ABECER



ABECer

ASSOCIAÇÃO BRASILEIRA DE ESTIMULAÇÃO CEREBRAL