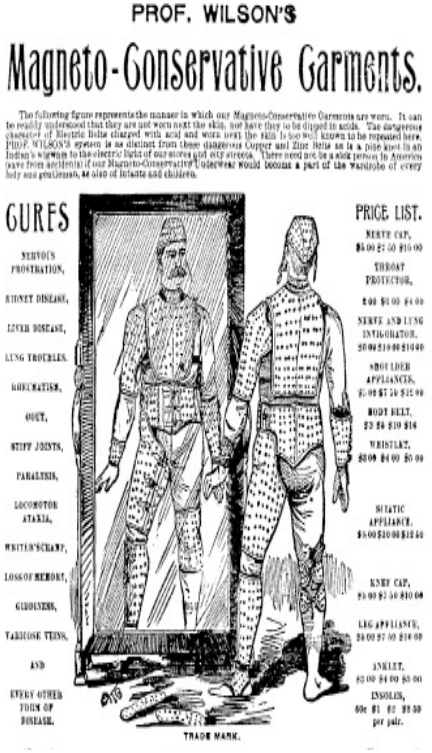
Deux sortes d'électricité: entre vie et mort

J.A. Micoulaud Franchi / C. Daudet

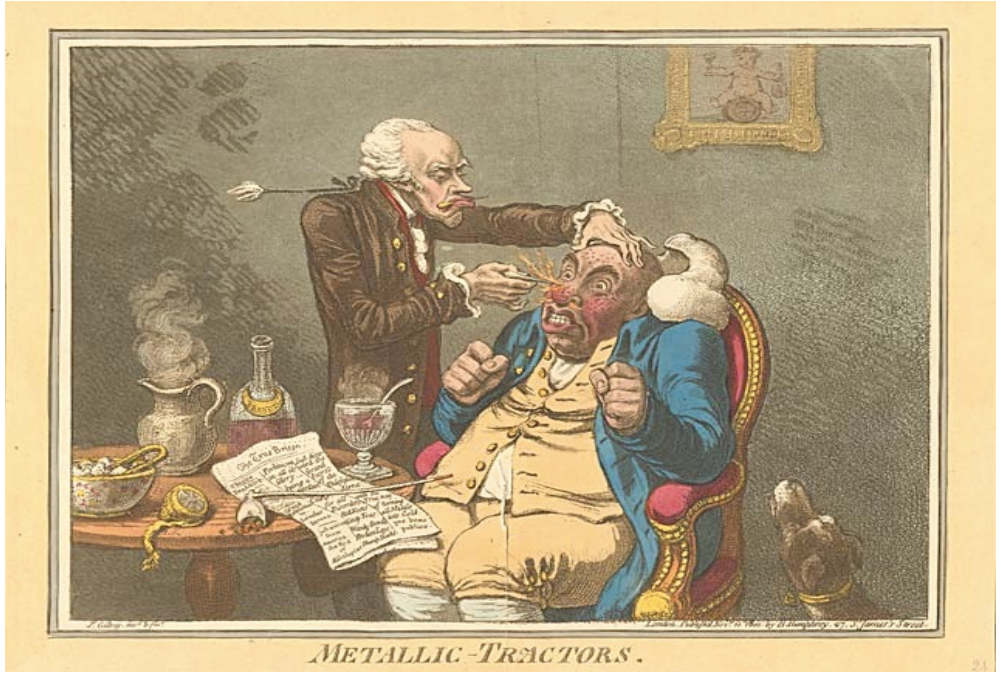
Mardi 1er Février 2022- séminaire 1 Bordeaux visioconférence

DIU « pratique et théorie de l'éléctroconvulsivothérapie »

Magnétisme , aux origines

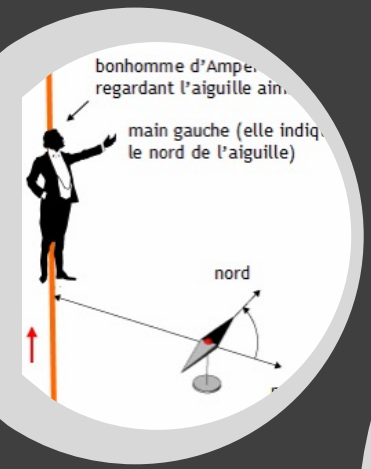


- La pierre de magnésie
- Connue depuis l'antiquité grecque (Magnus) en Asie Mineure
- Attire des petits morceaux de fer
- Magnets:
- goutte, arthrite, calvitie,
- aphrodisiaques, purification des
- plaies et retrait de corps étrangers
- (têtes de flèches et lames)

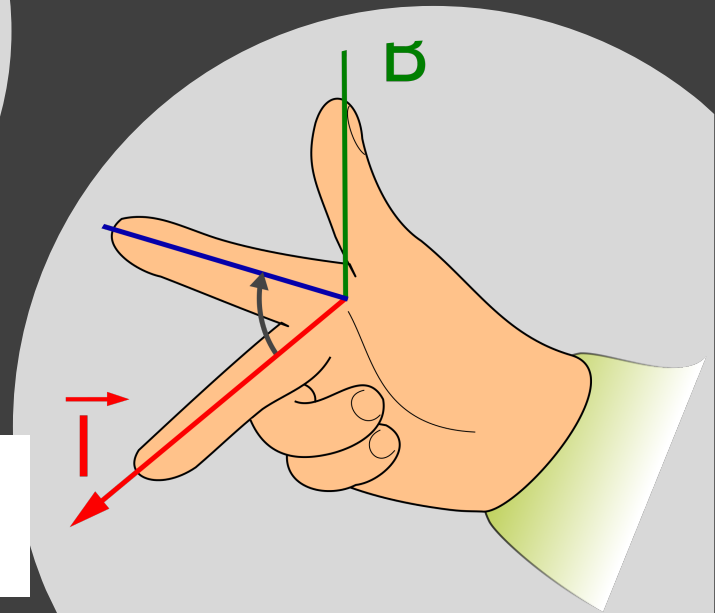


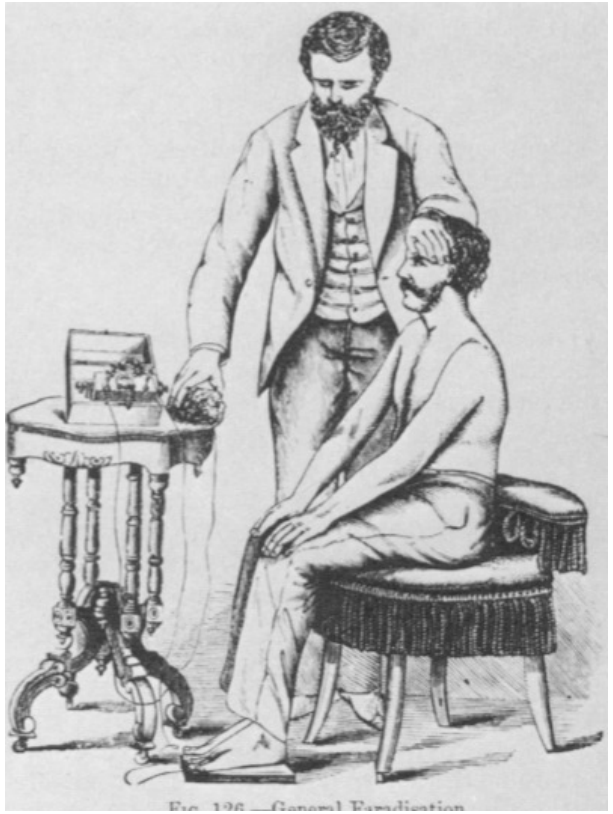
Une révolution en 1820

- 1820: Oersted, relation entre électricité et magnétisme
- 1820: Ampère, théorie de l'électrodynamie

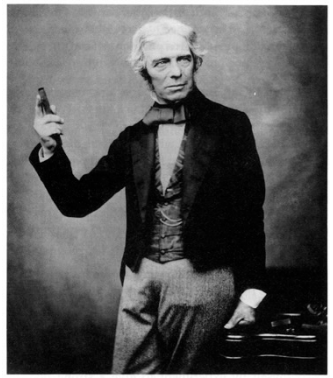


- pouce = *champ* (sens du flux magnétique) $\vec{B}$
- index = *chemin* (sens de la force créant le mouvement) $\vec{F}$
- majeur = *courant* (sens du courant) $\vec{I}$





Loi de Faraday
Faradisation



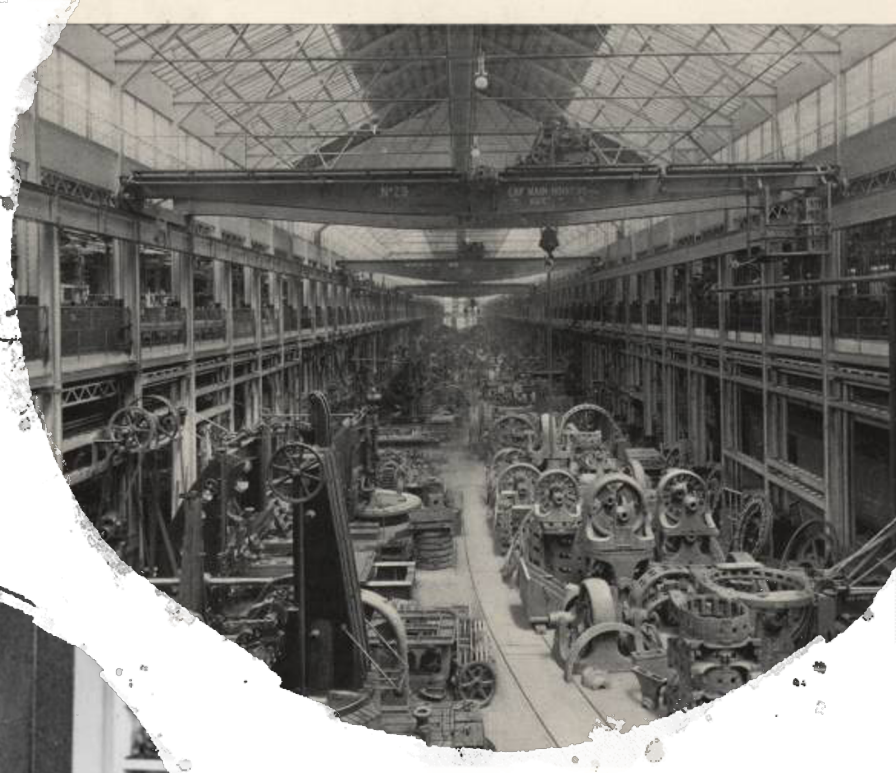
- 29 Août 1831: découverte de l’induction électro-magnétique
- Loi de Faraday

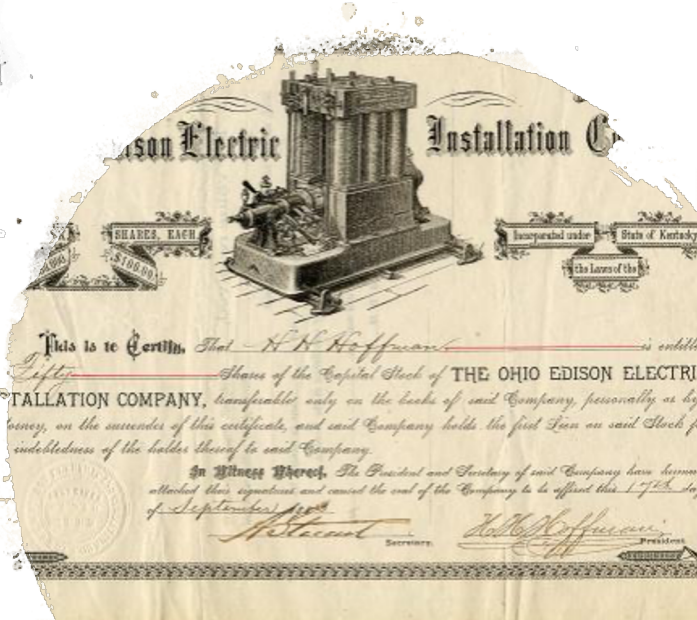
$$\varepsilon = -\frac{\mathrm{d}\Phi}{\mathrm{d}t}$$

- Faradisation
- ***1836***: electrical room, Guys Hospital,
- 1837: Addison, maladies convulsives et spasmodiques
- 1841: Golding-Bird, amenorhées

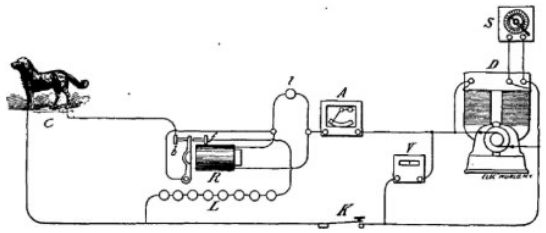
la rivalité entre Edison et Tesla…

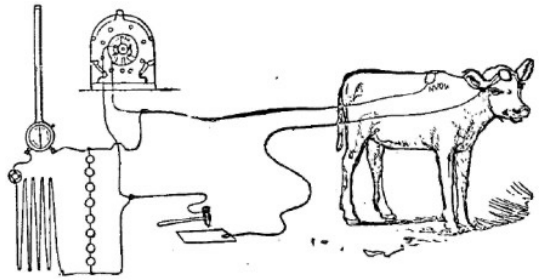
- 1882, la « Edison electric light company » fonde la 1ère centrale électrique (générateur de courant continu)
- 1886, Westinghouse défend le générateur de courant alternatif de Tesla, nettement supérieur pour les applications à grande échelle

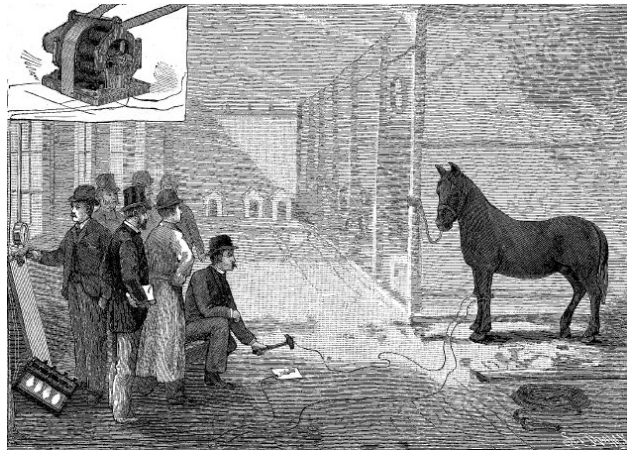




Campagne de publicité de Thomas Edison



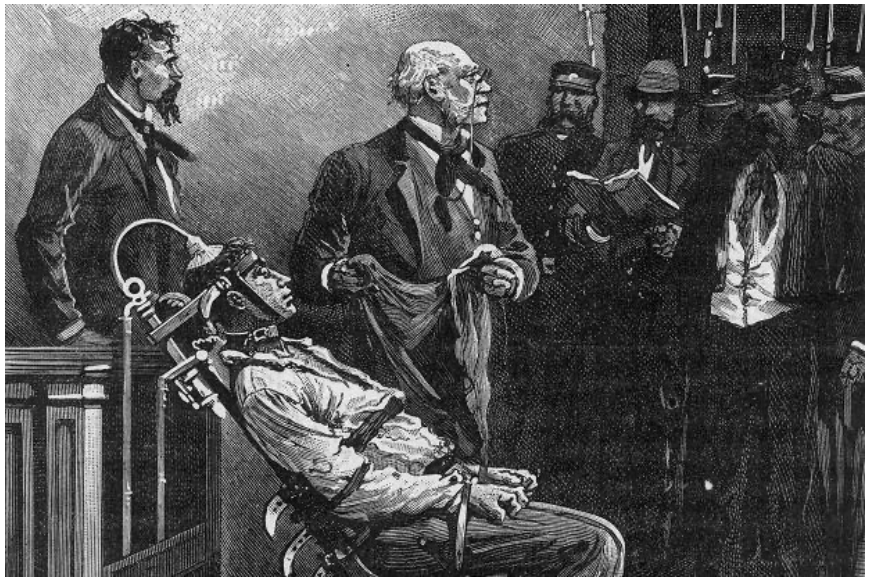




La chaise électrique

1887, en plein débat sur la pendaison, Edison veut démontrer la dangerosité du courant alternatif en électrocutant des animaux (chats, chiens, chevaux)
1888, Brown teste sa chaise sur des primates
6 avril 1890, exécution de Kemmler (300V, 17s, 2 chocs)
Le courant alternatif , et donc l'électricité, devient

Synonyme de … mort



À moins que…

Brain Stimulation xxx (2016) 1–9

Contents lists available at ScienceDirect

Brain Stimulation

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ig. 5. An ad for the "Anti-Doc" medical apparatus from the January 1907 issue of *opular Mechanics.*

Recurrent themes in the history of the home use of electrical stimulation: Transcranial direct current stimulation (tDCS) and the medical battery (1870–1920)

Anna Wexler [a, b, *]

[a] *Department of Science, Technology & Society, Massachusetts Ins*
[b] *Center for Neuroscience and Society, University of Pennsylvania*

ician's Faradic Battery, as depicted in an 1888 Noyes Bros. & Cutler medical catalogue. The battery itself is hidden from

Le discrédit ne vienne du DIY!

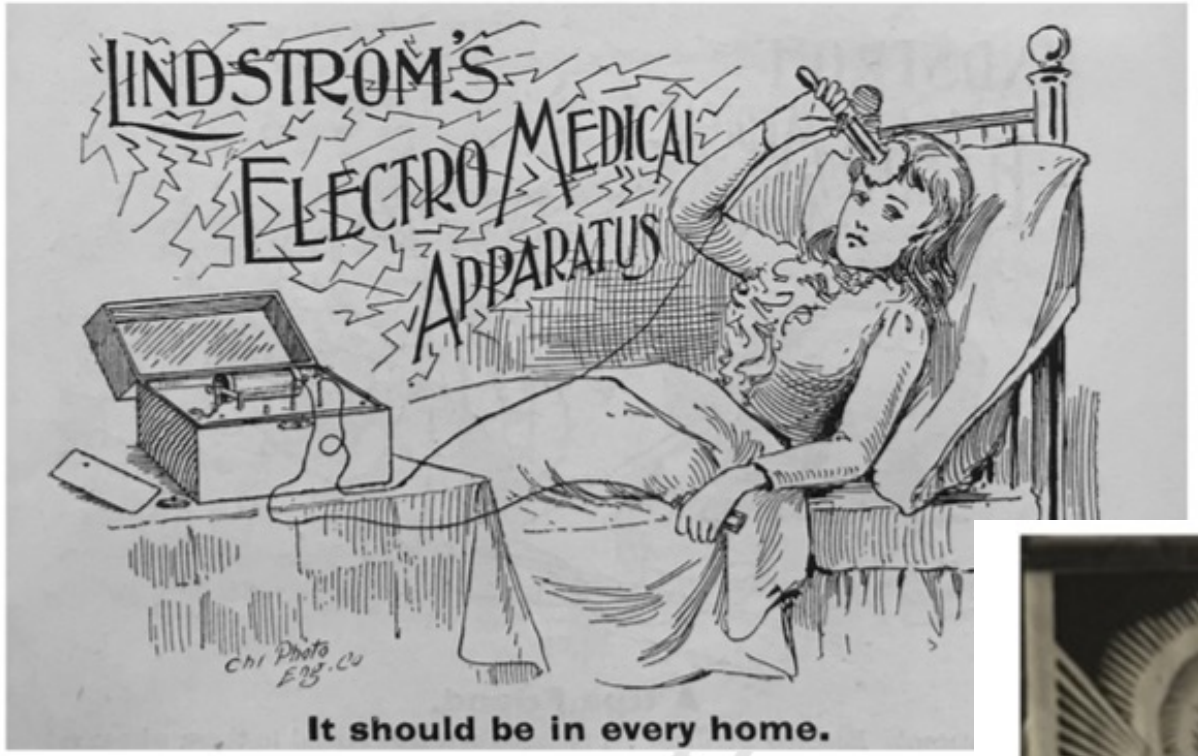
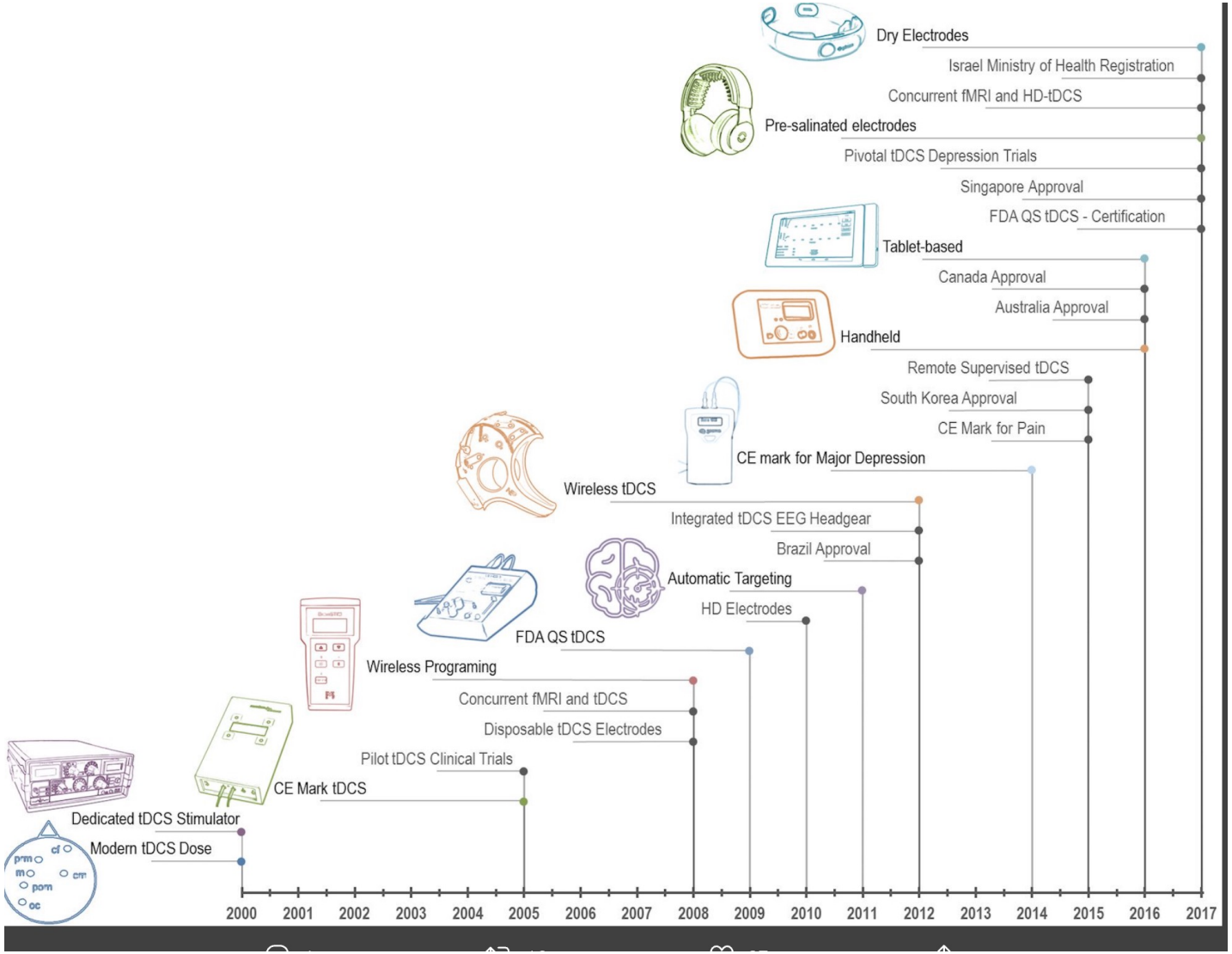
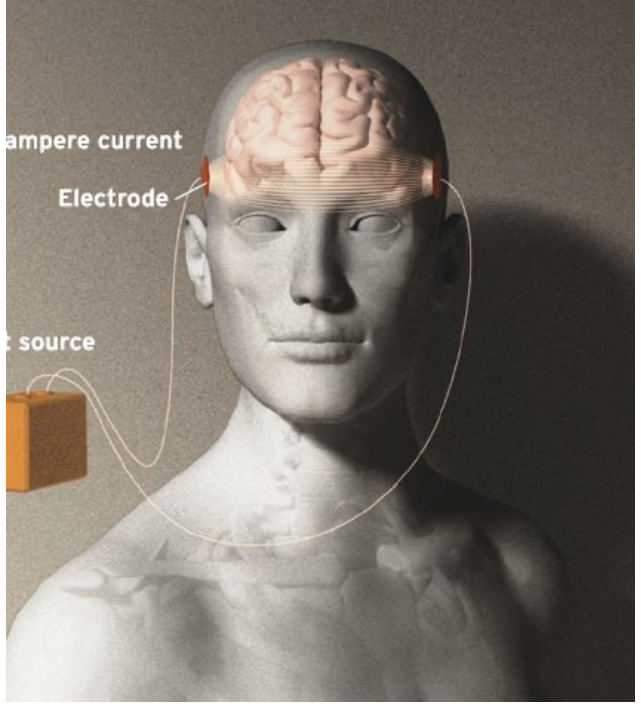


Fig. 4. Lindstrom's Electro-Medical Apparatus (ca. 1895), courtesy of the Bakke

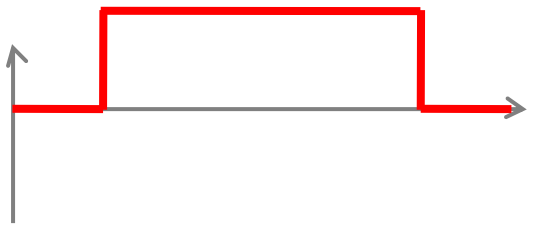
for the Konzentrator, circa 1927–1928, courtesy of the American Medical Association. Right: Thync electrical stimulation dev

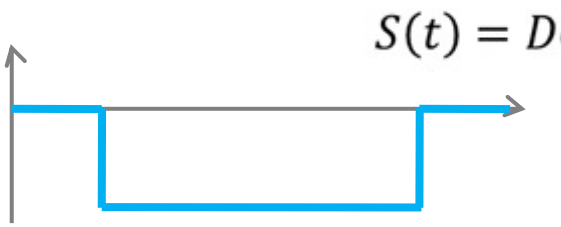
Car il faudra attendre le XXIe siècle…

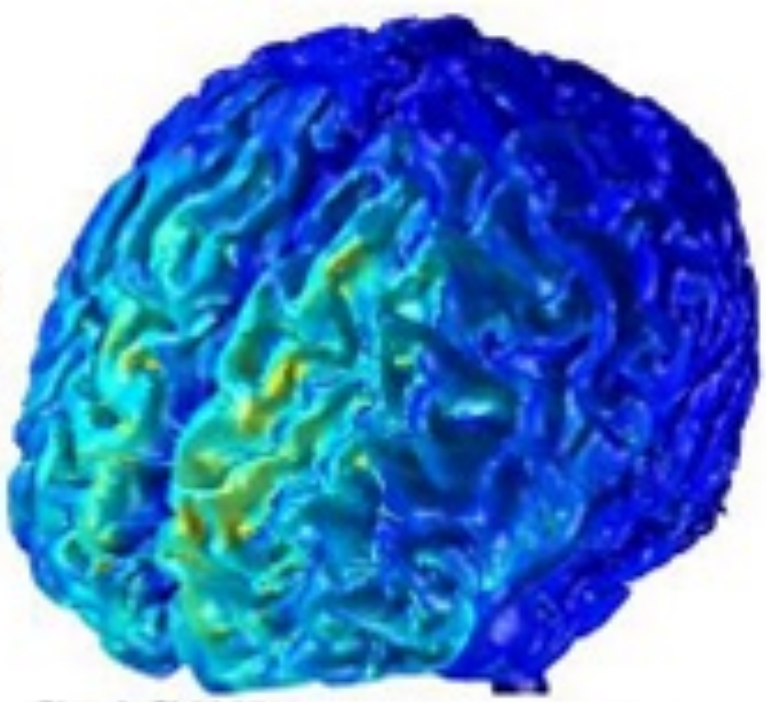




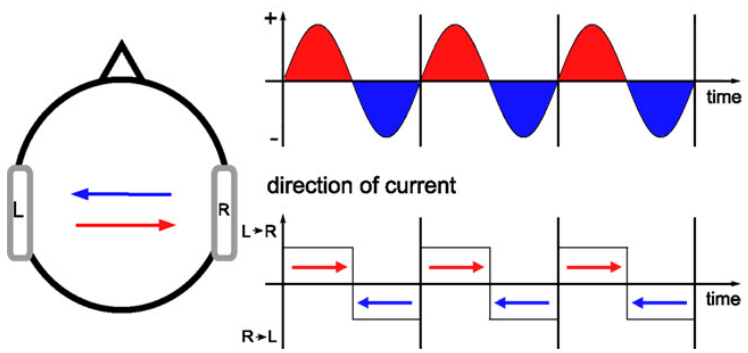
La tDCS, regain d'intérêt de la galvanisation?







- La tACS, regain d'intérêt de la faradisation?



$S(t) = A\ Sin\ (wt + phi)$

De l’électricité au champs magnétique

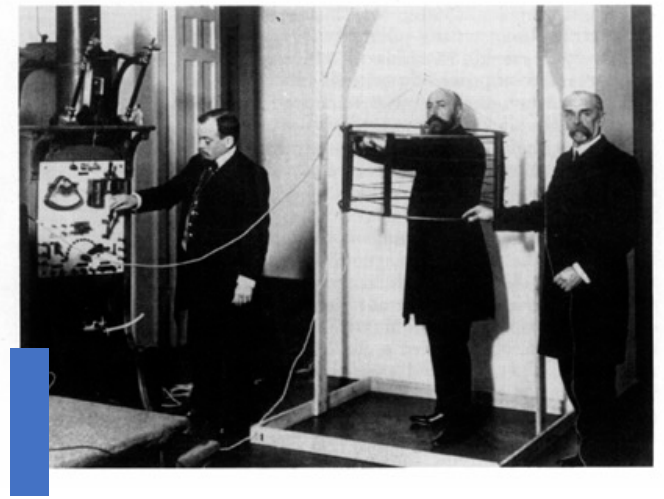
Le vrai « faux » retour du magnétisme

- D'Arsonval, ***1896***

110 V, 30 A, 42 Hz

Magnetophosphènes

vertiges voire syncope



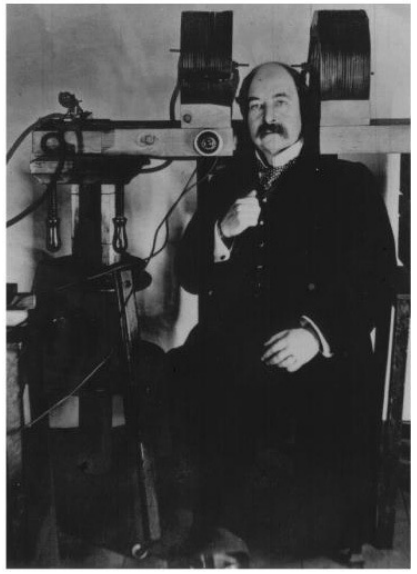
Thompson, 1910

Magnusson et Stevens

1911

Stimulation rétinienne

Et non pas occipitale

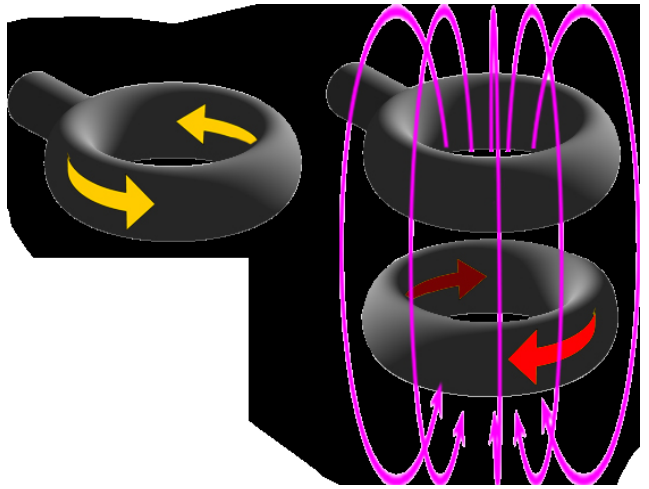


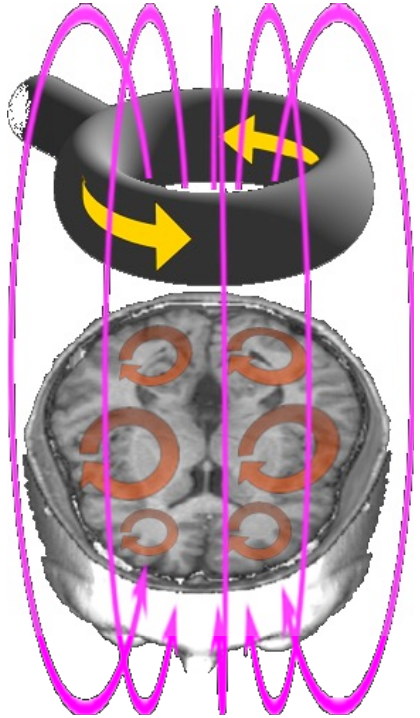
Vers la stimulation magnétique corticale

- 1959, Kolin: stimulation préparation musculaire de grenouille (nerf sciatique)
- 1965, Brickford et Fremming: stimulations musculaires, humaines et animales, variation sinusoïdale de champs magnétique
- 1981, Polson, Barker: stimulation de nerfs périphériques, impulsions brèves, enregistrement de PA
- 12 février 1985, laboratoire du Pf Merton, National Hospital, Londres: Barker réalise la 1ère stimulation magnétique corticale (publiée en mai 1985)

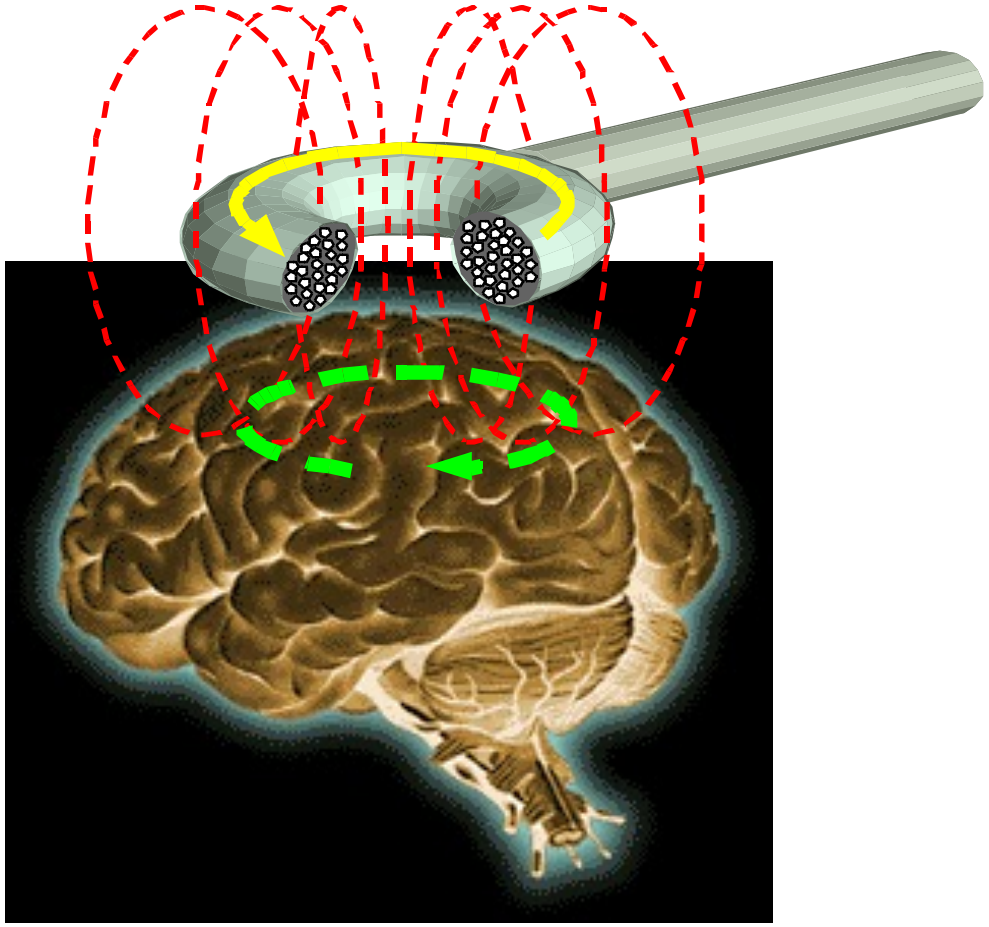
Induction électromagnétique

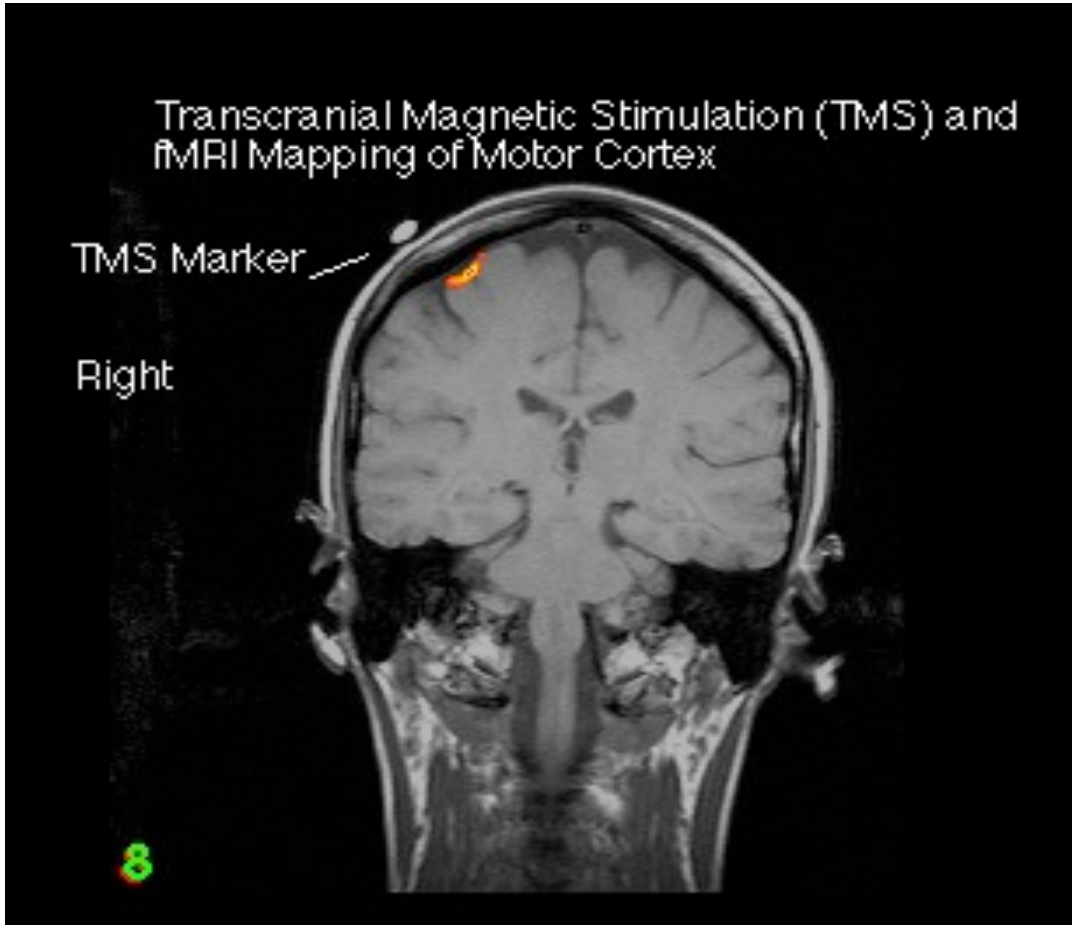
- tissu cérébral: le courant induit est environ un cent millième du primaire (Cadwell, 1989)
- 10 000 A et 1000 V sont atteints lors de pulsations de 1/5000 secondes
- 1.5 à 2.5 Tesla
- 40 000 fois le champs magnétique terrestre
- 1 cc, soit 200 neurones reliés à 500 autres à distance du site de stimulation





TMS modifie l’activité régionale corticale

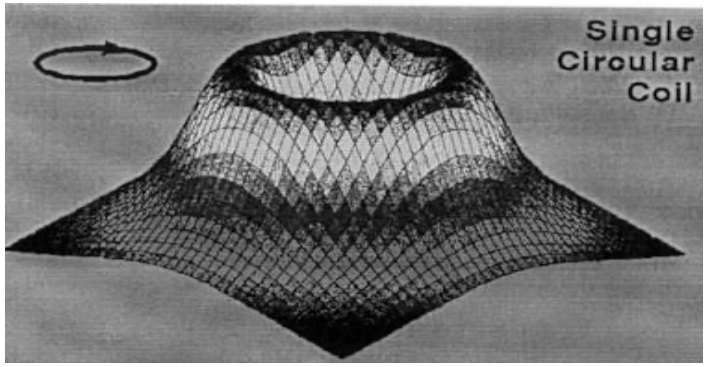


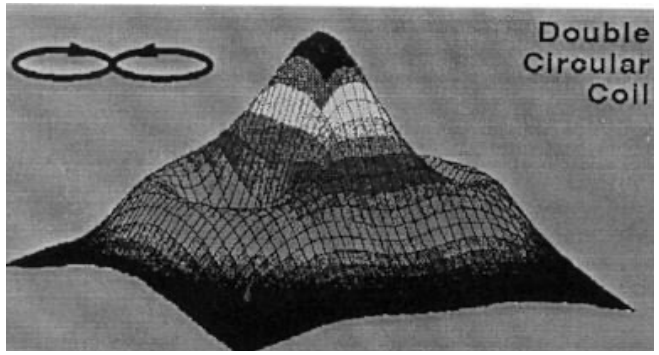


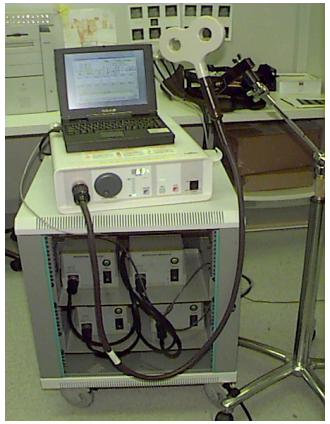
Considérations techniques

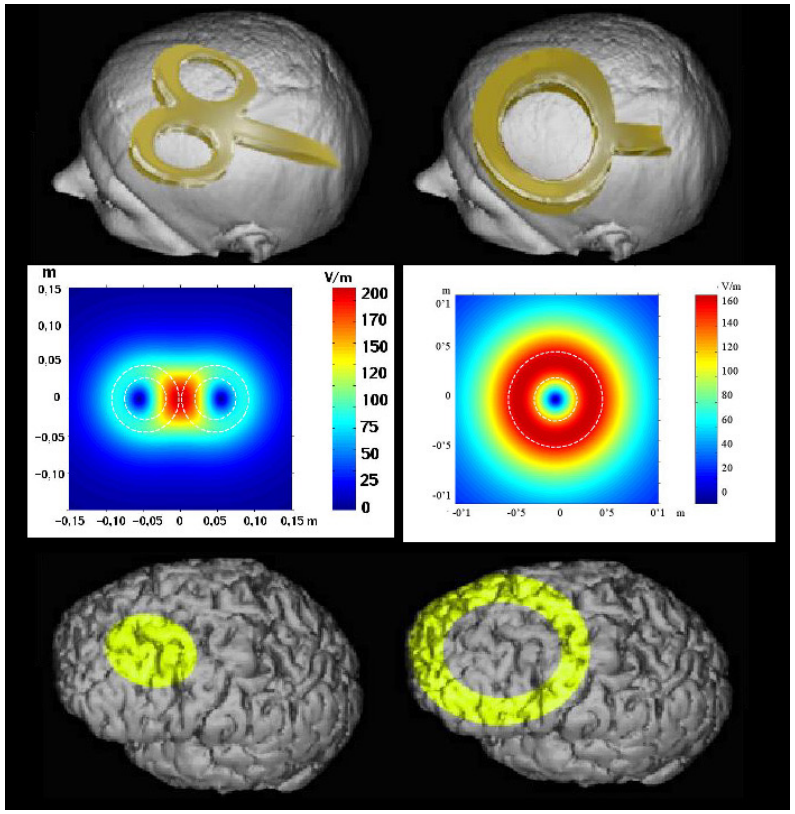
Circular coil

Figure eight coil



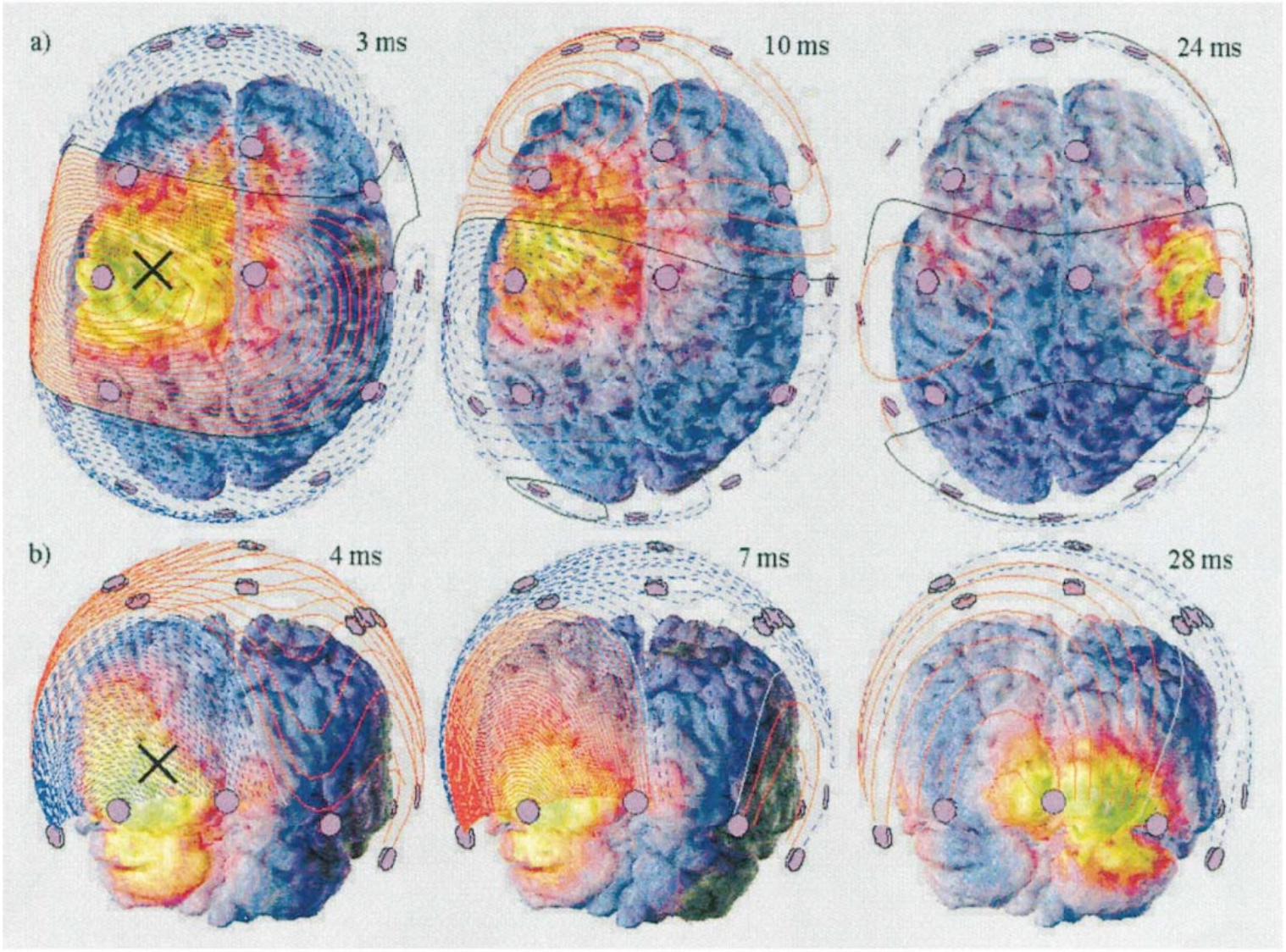


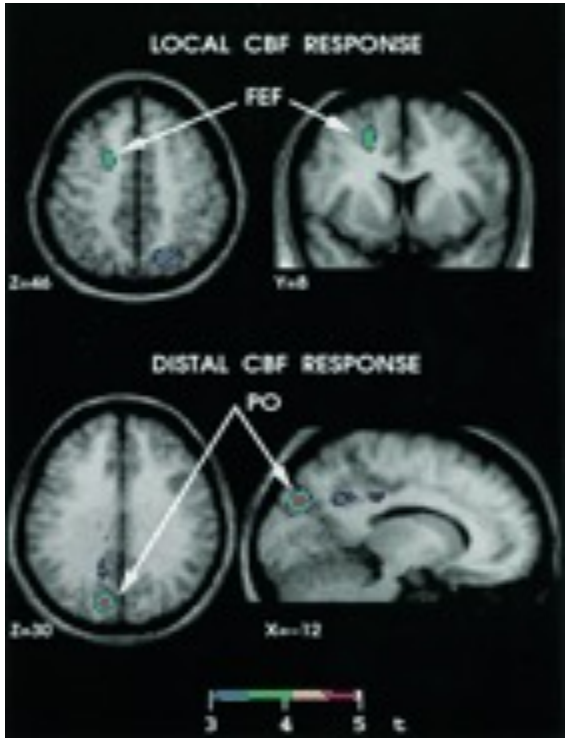


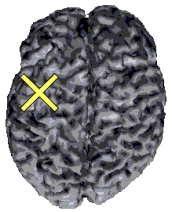


Bobines de stimulation

Propagation d'effet à distance du site de stimulation par réseau neuronal







Oui, mais l'effet d'attente?

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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

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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

Un peu de piquant! Jiang B. , Sichuan, China

73.5% de l'effet rTMS = placebo

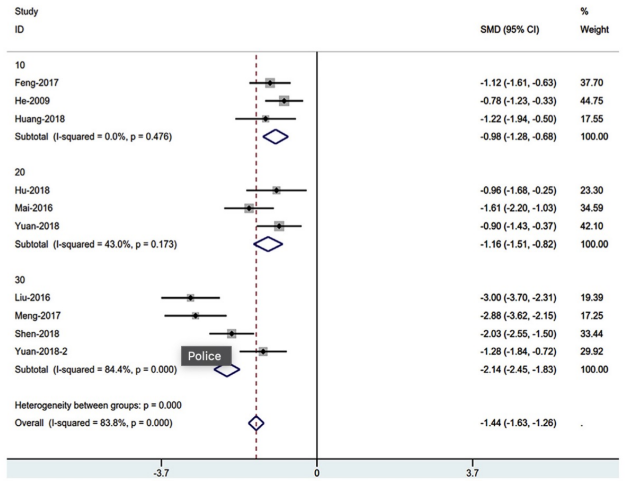

Fig. 2. Meta-analysis of the effect of active rTMS on PSQI. The pooled between-group effect size estimates (Hedges' *g*) of PSQI seemingly increased with the increase of treatment duration within 30 days. rTMS, repetitive transcranial magnetic stimulation; PSQI, Pittsburgh Sleep Quality Index; CI, confidence interval; SMD, standard mean difference.

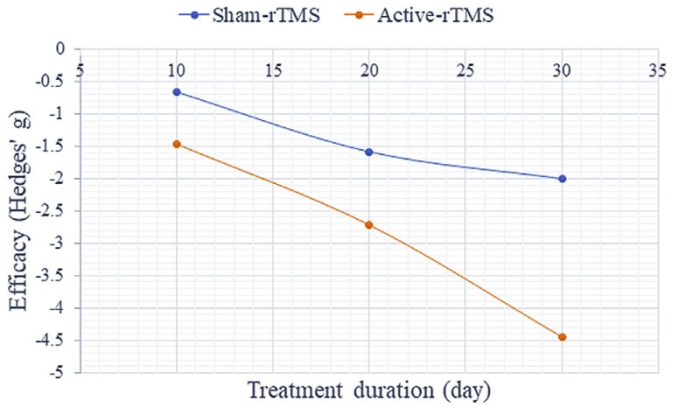

Fig. 3. Meta-analysis of the effect size of PSQI for separate active rTMS and sham rTMS. The pooled within-group effect size estimates (Hedges' *g*) of PSQI seemingly increased with the increase of treatment duration within 30 days. rTMS, repetitive transcranial magnetic stimulation; PSQI, Pittsburgh Sleep Quality Index.

Table 1
Characteristics of included studies.

Study	Sample size	Age, y (SD)	Female, *n*	Criteria	Stimulation site	Intensity	Frequency	Duration	Sham	Quality
He-2009 [16]	82	37.1 (16.9)	55	DSM-IV	Right dorsolateral prefrontal cortex	100%	1 Hz	10 days	sham coil	4/1/2
Liu-2016 [17]	70	55.3 (10.3)	37	DSM-IV	Right dorsolateral prefrontal cortex	80%	1 Hz	4 weeks	coil tilted 180°	3/1/2
Mai-2016 [18]	60	42.5 (22.1)	31	ICD-10	Right dorsolateral prefrontal cortex	100%	1 Hz	2 weeks	sham coil	3/1/2
Feng-2017 [19]	80	44.5 (8.1)	54	ICD-10	Right dorsolateral prefrontal cortex	80%	1 Hz	10 days	coil tilted 90°	3/1/2
Meng-2017 [20]	60	46.3 (11.7)	30	ICD-10	Right dorsolateral prefrontal cortex	100%	1 Hz	4 weeks	sham coil	3/1/2
Hu-2018 [21]	34	75.5 (7.24)	13	DSM-V	Right dorsolateral prefrontal cortex	100%	1 Hz	4 weeks	coil tilted 90°	3/1/2
Shen-2018 [22]	98	41.0 (9.1)	56	ICD-10	Right dorsolateral prefrontal cortex	80–130%	0.5–1 Hz	4 weeks	20% intensity	3/1/3
Yuan-2018 [23]	60	52.5 (13.5)	34	ICD-10	Right dorsolateral prefrontal cortex	90–110%	1 Hz	4 weeks	coil tilted 180°	3/1/2
Huang-2018 [24]	36	45.1 (11.2)	18	DSM-IV	Right posterior parietal cortex	90%	1 Hz	10 days	sham coil	4/1/3