

Present Helping Patients
However.....only the beginning

Future Realize the Promise of Neuromodulation



Noninvasive Neuromodulation does not represent a treatment for an illness, but offers **tool** that allows modulation of the neural substrate of **symptoms and disabilities** caused by brain illnesses or dysfunctions



Present

Helping Patients
Learning about the Brain

Future

Realize the Promise of Neuromodulation
Precision Medicine Approach

1. Target symptoms/complaints – not simply diagnostic entities
 - Identify disability localization
2. Measure and guide the intervention by the physiologic effect
 - Monitor physiologic effects (fMRI, EEG, etc)
3. Leverage state-dependency effects
4. Monitor behavioral effects and adapt parameters and target using close loop approaches



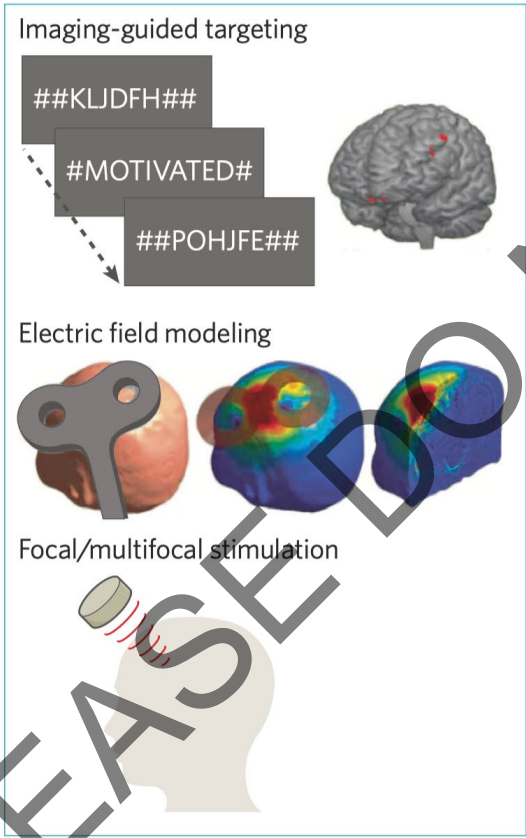


Future

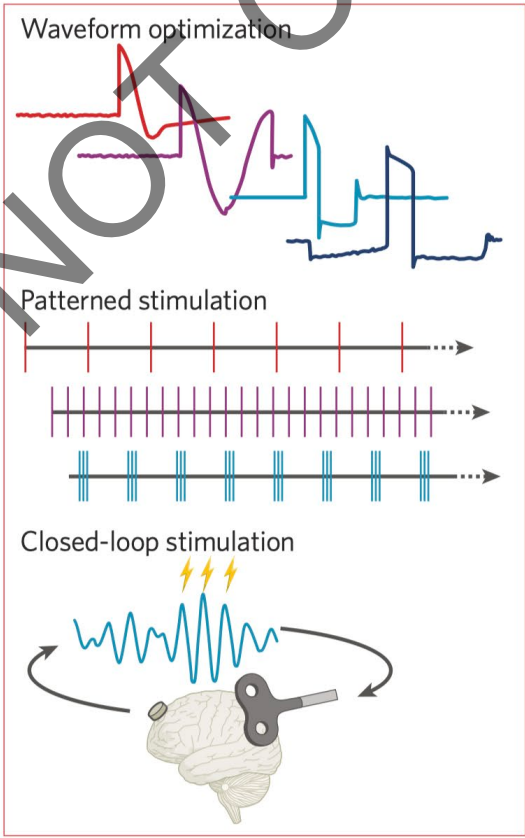
Realize the Promise of Neuromodulation



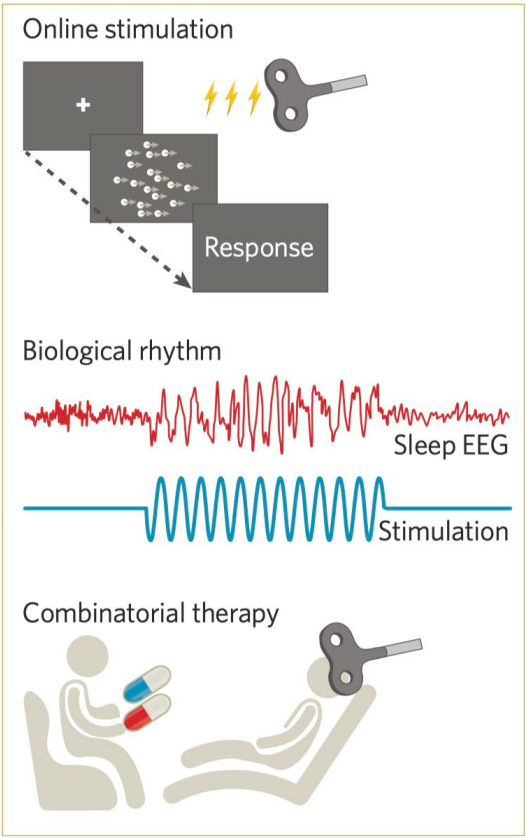
Spatial precision



Temporal precision



Contextual precision

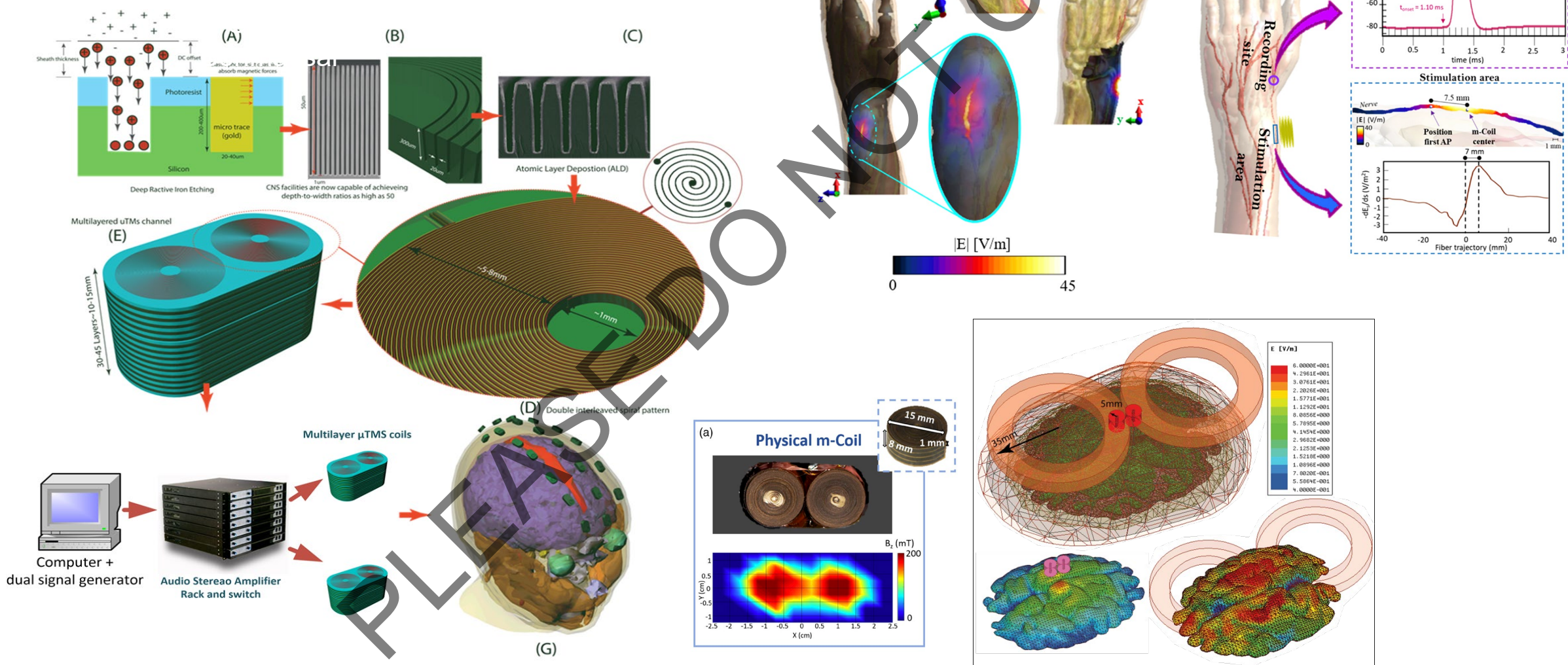




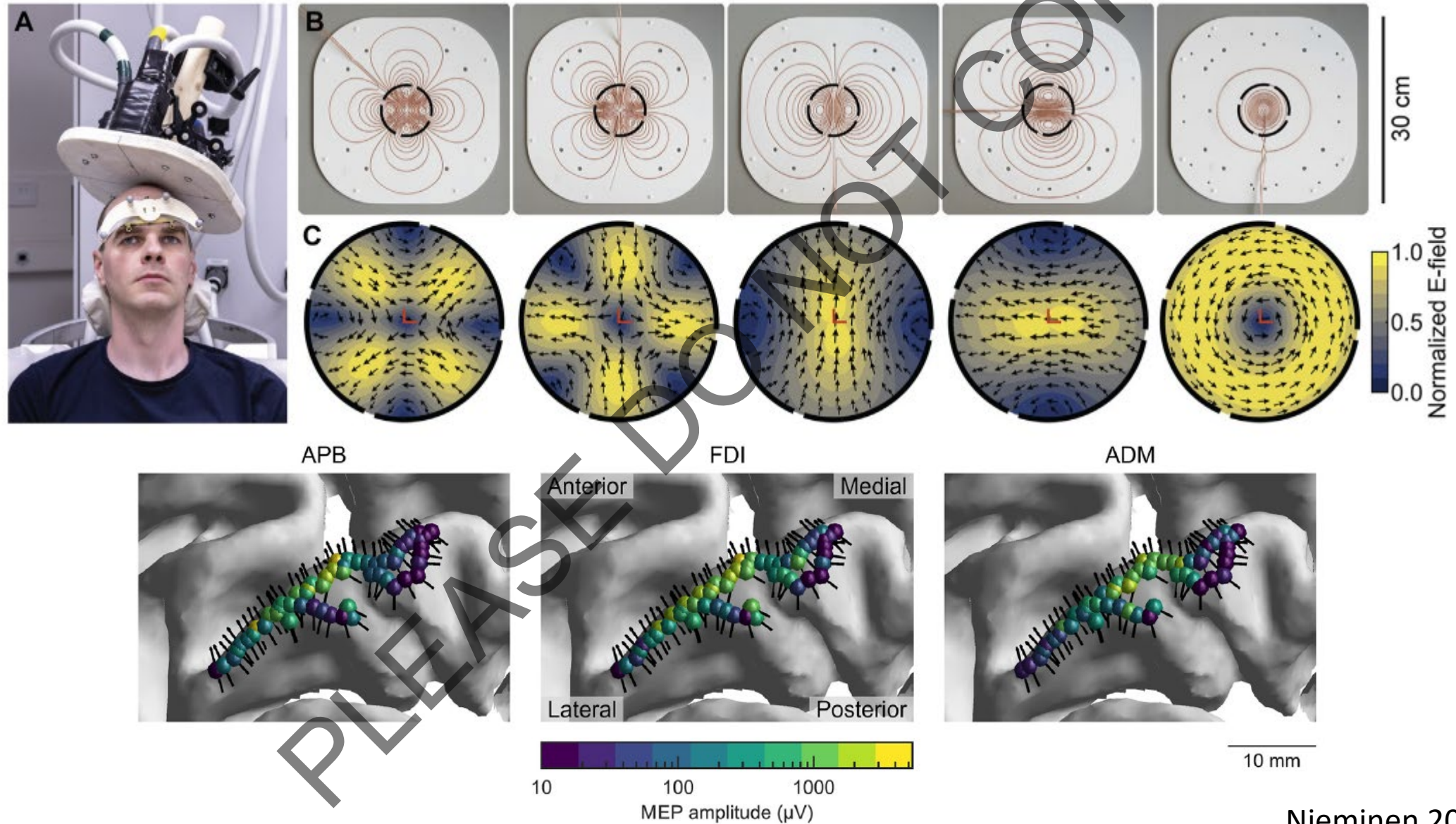
Giorgio Bonmassar

μ TMS

Colella et al. *Annu Int Conf IEEE Eng Med Biol Soc.* 2019
Colella et al. *Med Phys.* 2023



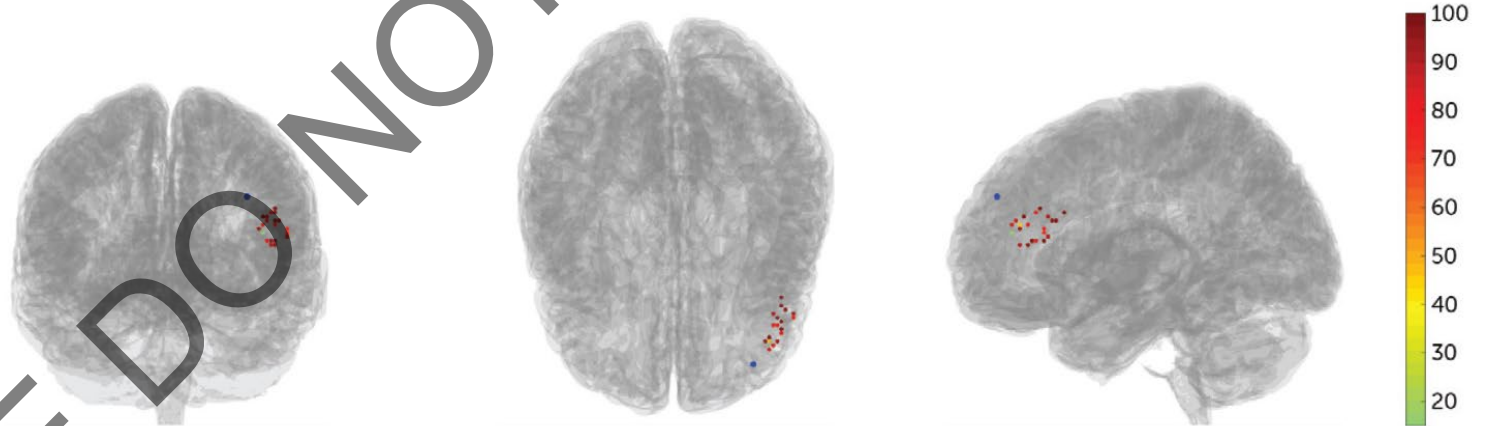
Multi-locus TMS



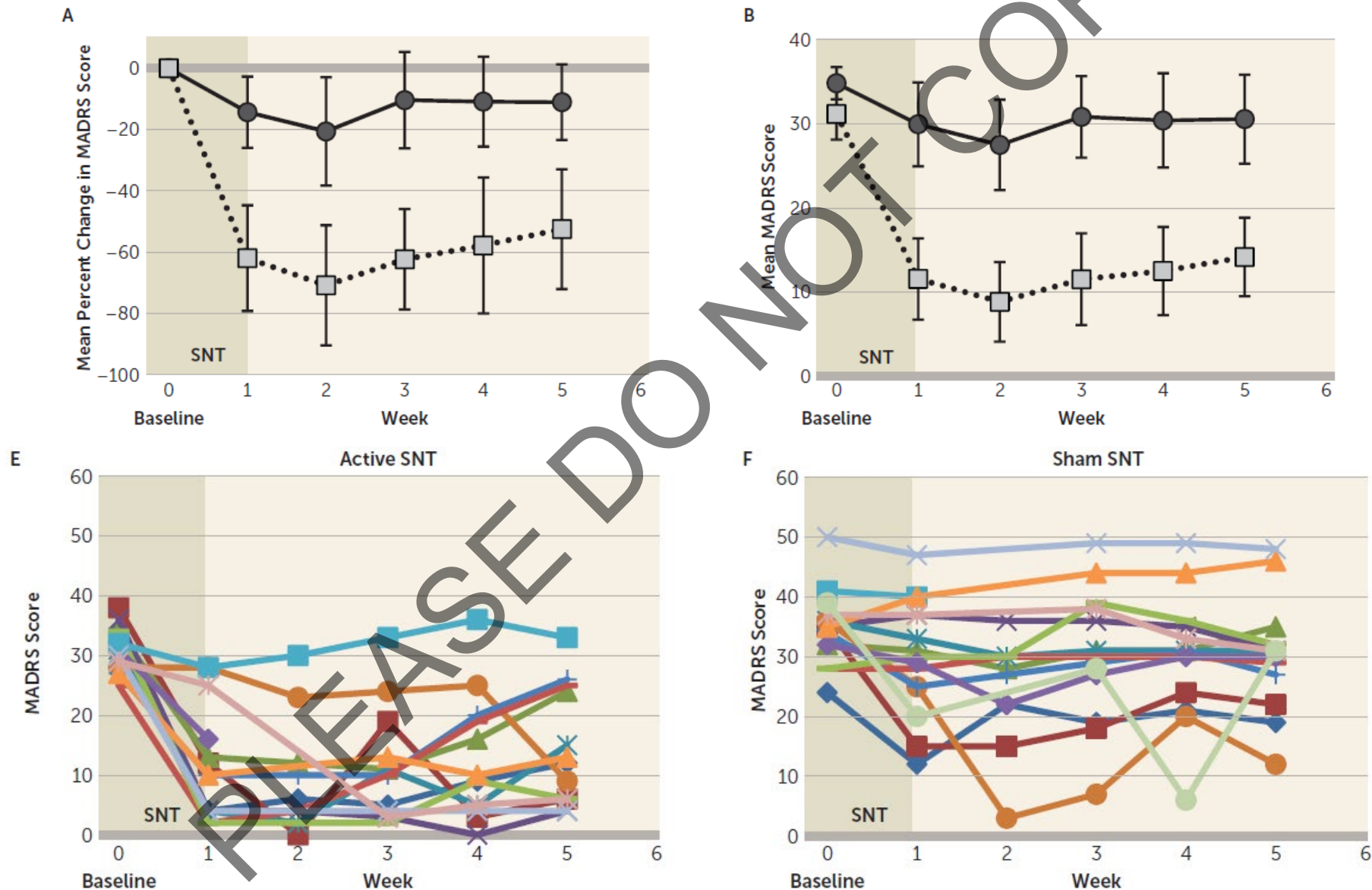
Accelerated TBS (SAINT)

B

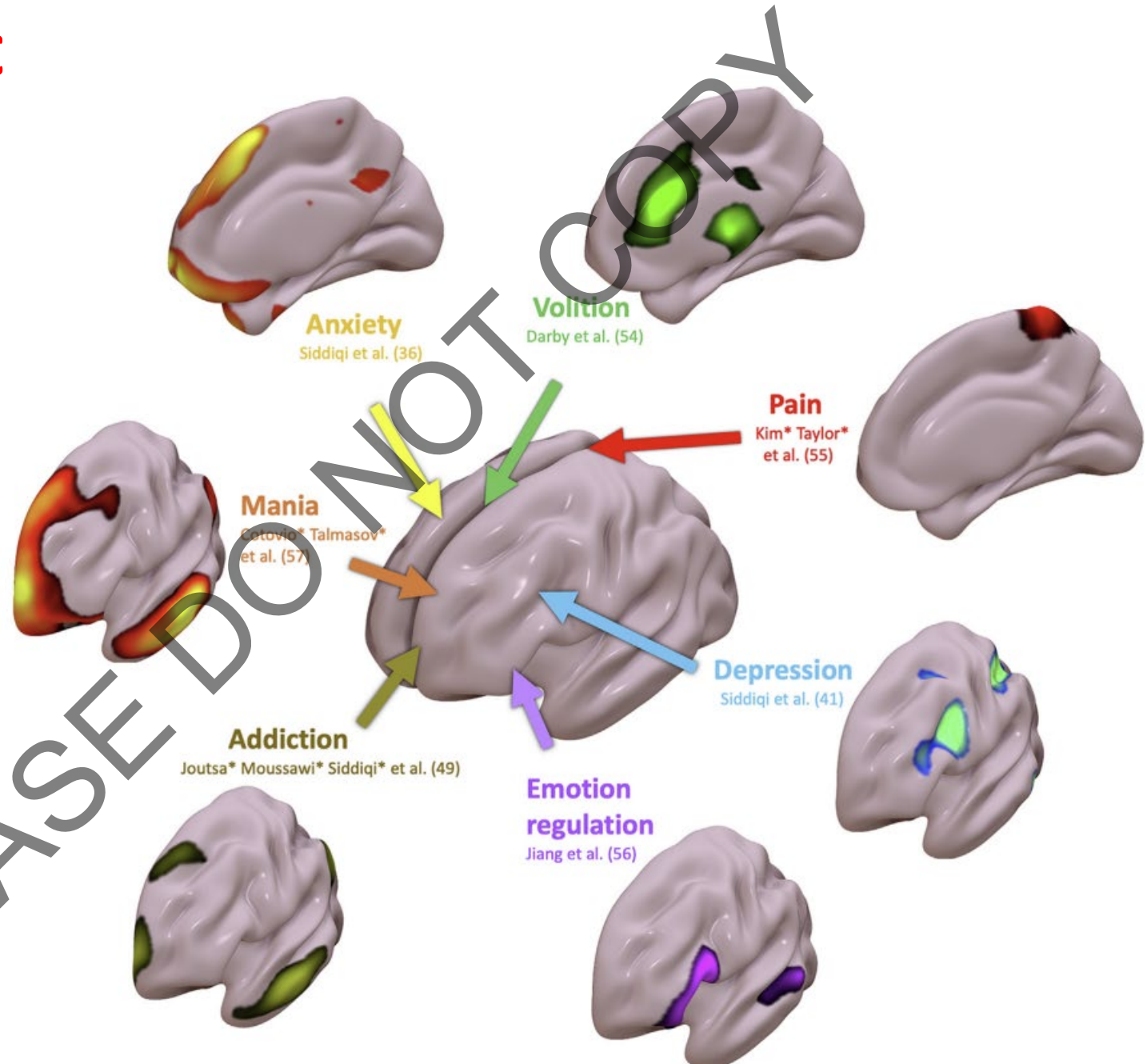
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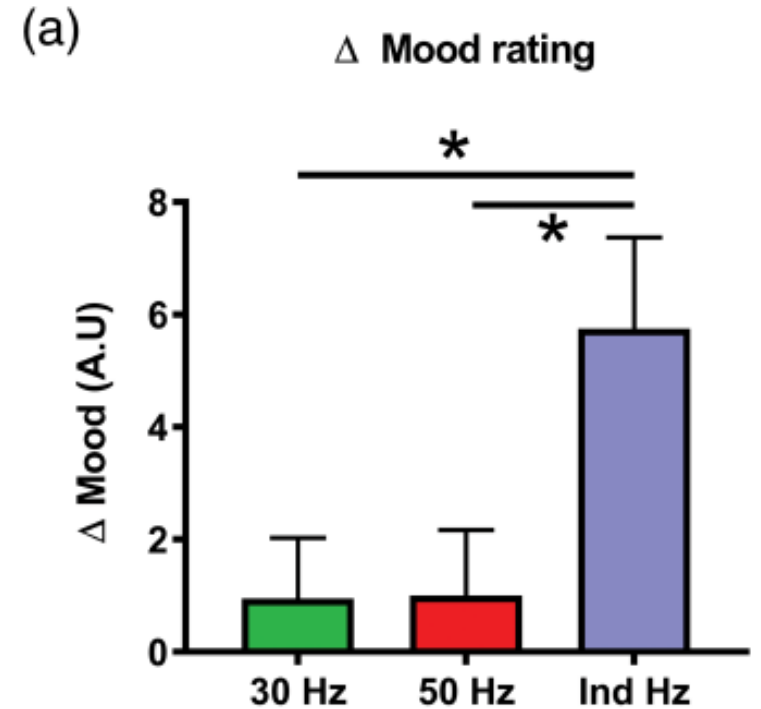
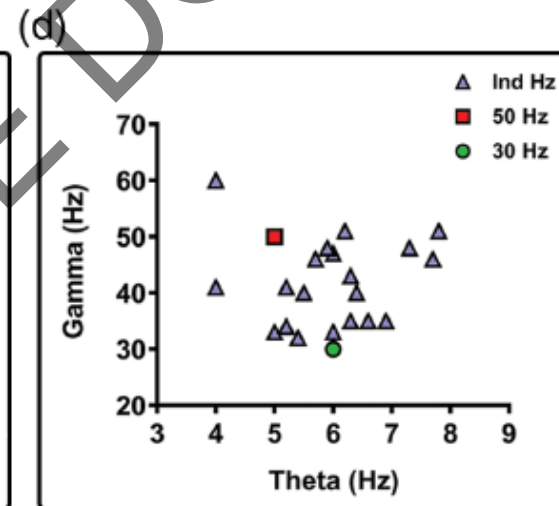
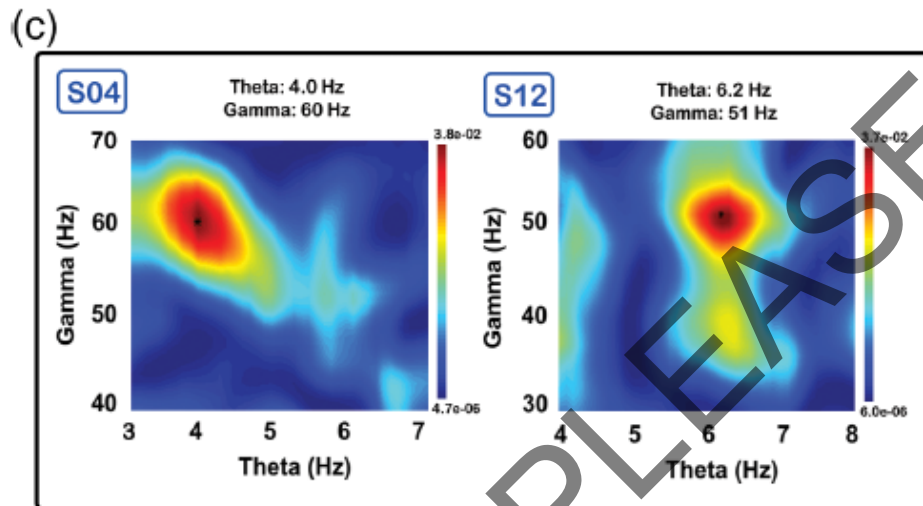
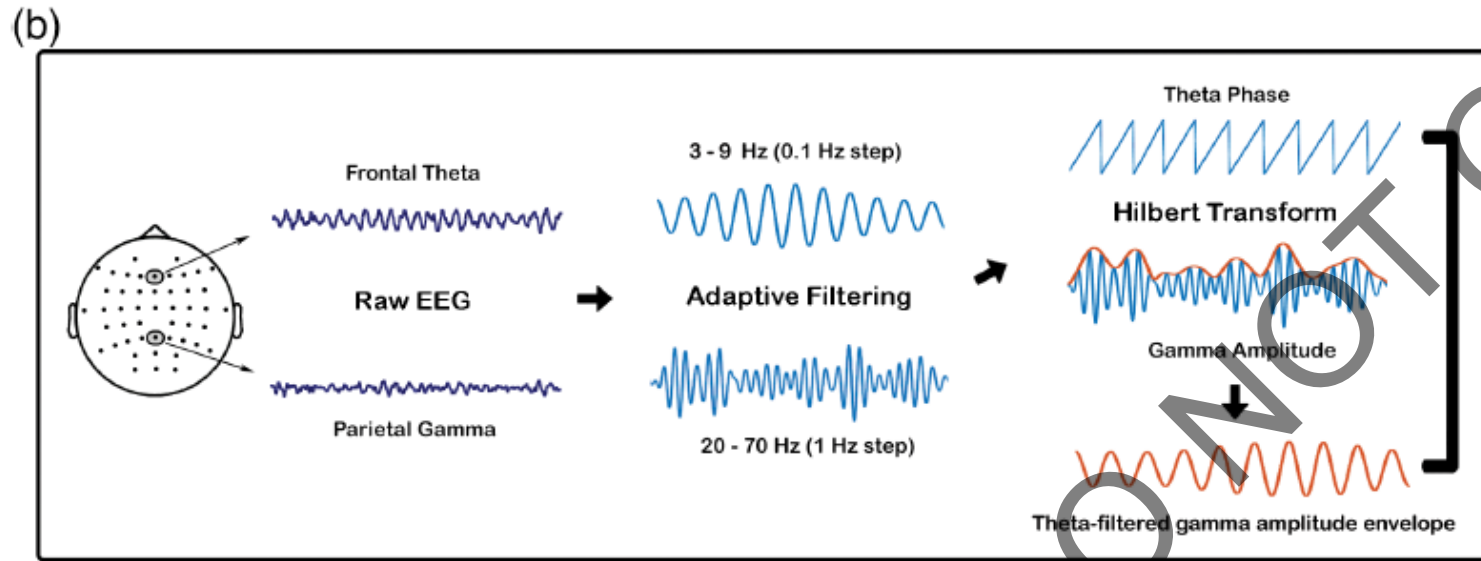
Accelerated TBS (SAINT) results



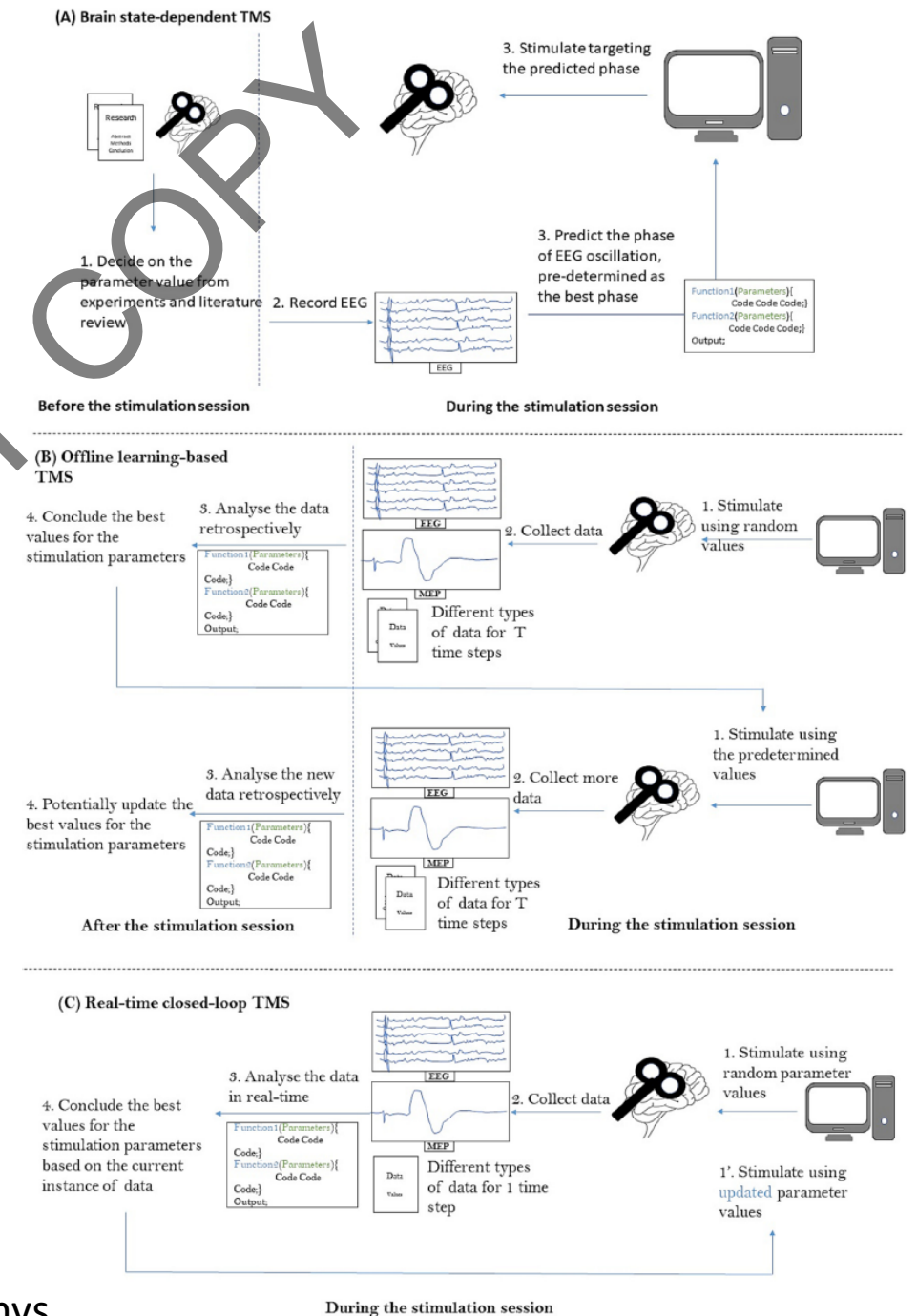
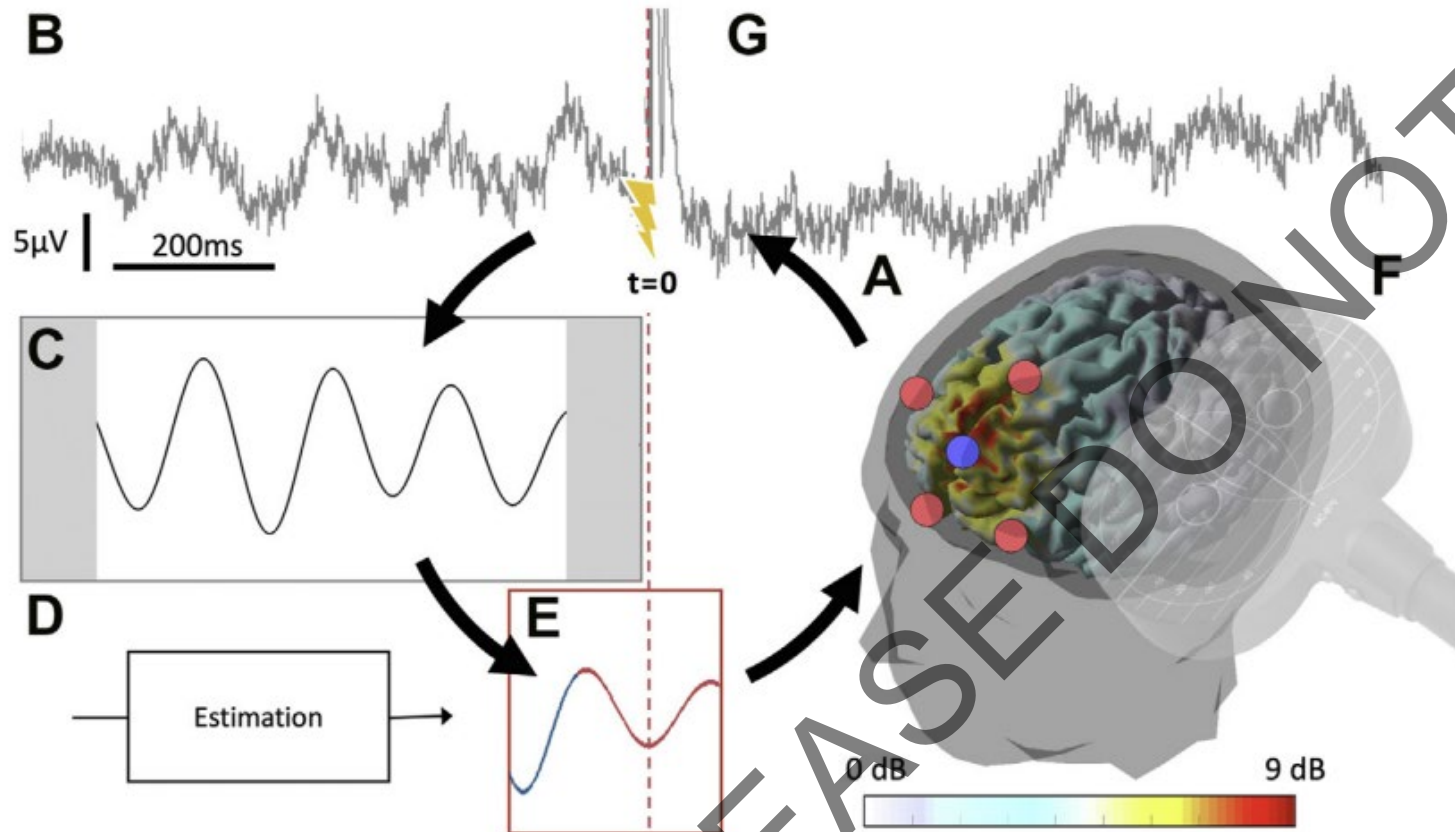
Symptom-specific targeting



Personalized parameters



Closed-loop EEG-TMS modulation



TMS + drugs

JAMA Psychiatry | Original Investigation

Efficacy of Adjunctive D-Cycloserine to Intermittent Theta-Burst Stimulation for Major Depressive Disorder A Randomized Clinical Trial

Jaeden Cole, BSc; Maya N. Sohn, BSc; Ashley D. Harris, PhD; Signe L. Bray, PhD; Scott B. Patten, MD, PhD;
Alexander McGirr, MD, PhD

