



Central European Institute of Technology
BRNO | CZECH REPUBLIC

Transcranial electric stimulation

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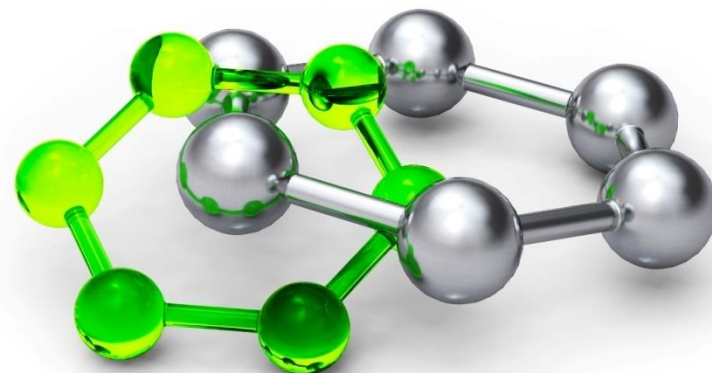
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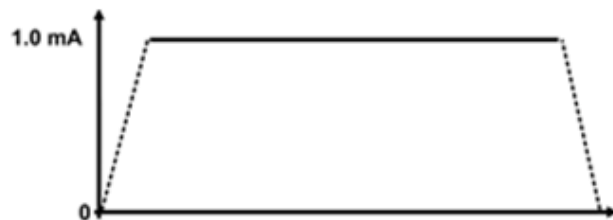
Transcranial electric stimulation

- Non-invasive, portable, well-tolerated **neuromodulation** technique
- Weak electrical current (1-2mA) applied directly to the head through two electrodes
- Modulates spontaneous cortical activity and excitability

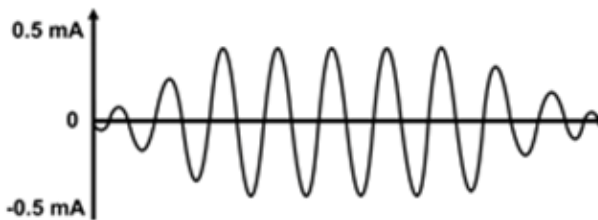


Modalities of tES

tDCS



tACS

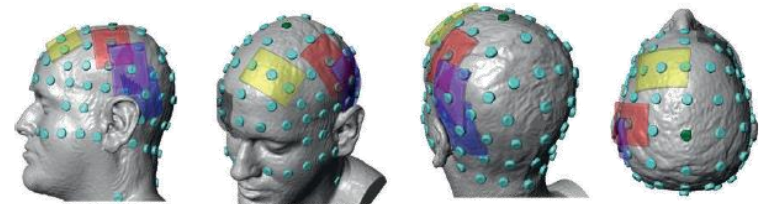


tRNS

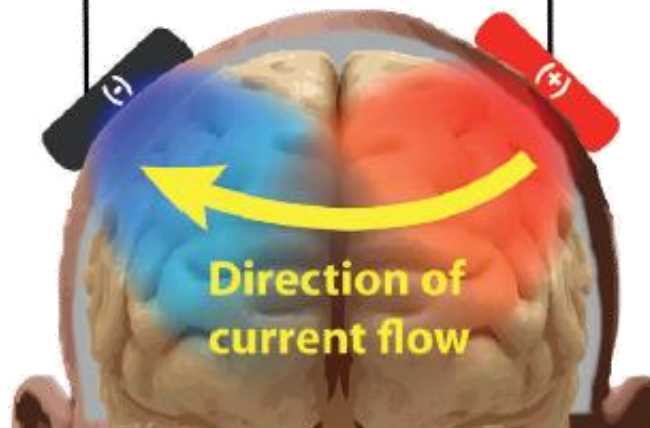
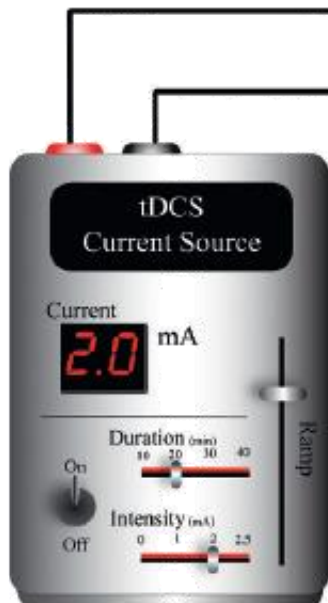


Transcranial direct current stimulation

- Polarity
- Intensity
- Duration
- Electrode placements (montage)



Contralateral Forehead: AF8 ★
PreMotor: F1 ★
Motor: C3 ★
PostMotor: CP5 ★
Occipital: P7 ★

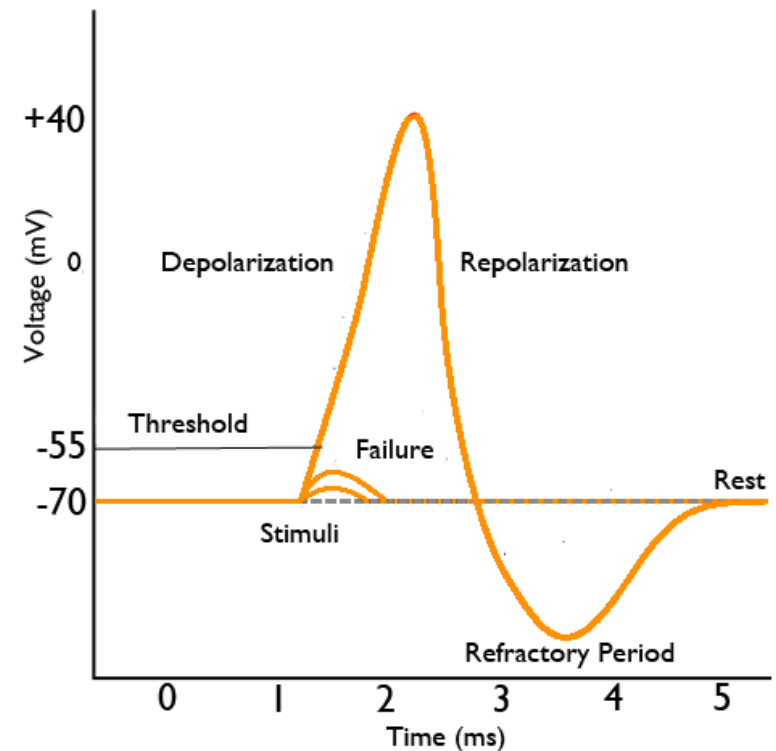


Anodal stimulation =
excitation

Cathodal stimulation =
inhibition

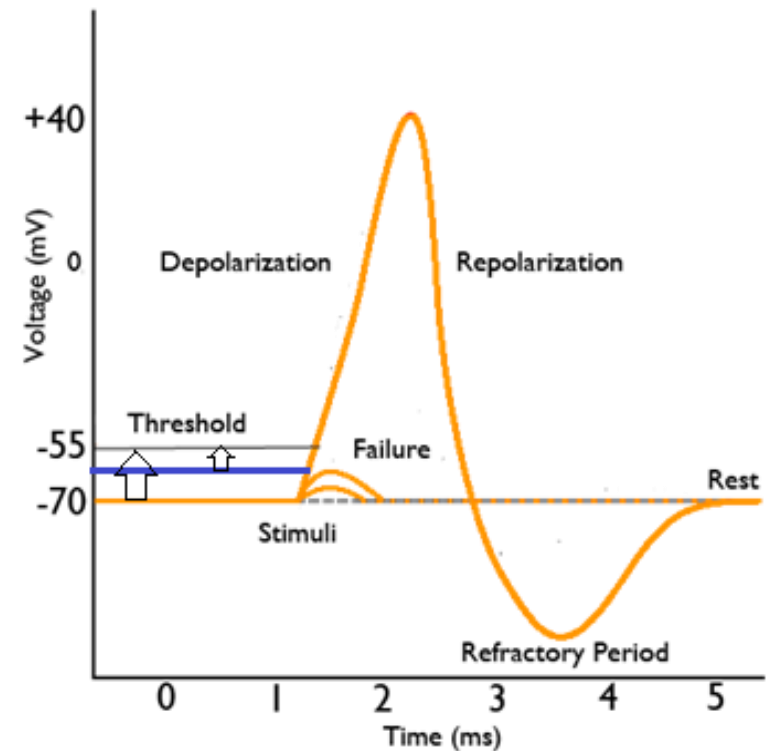
Primary mechanism

- Enhances the **probability** of firing action potential instead of triggering action potential → **increase or decrease in excitability**
- De- or hyperpolarization in cortical neurons



Primary mechanism

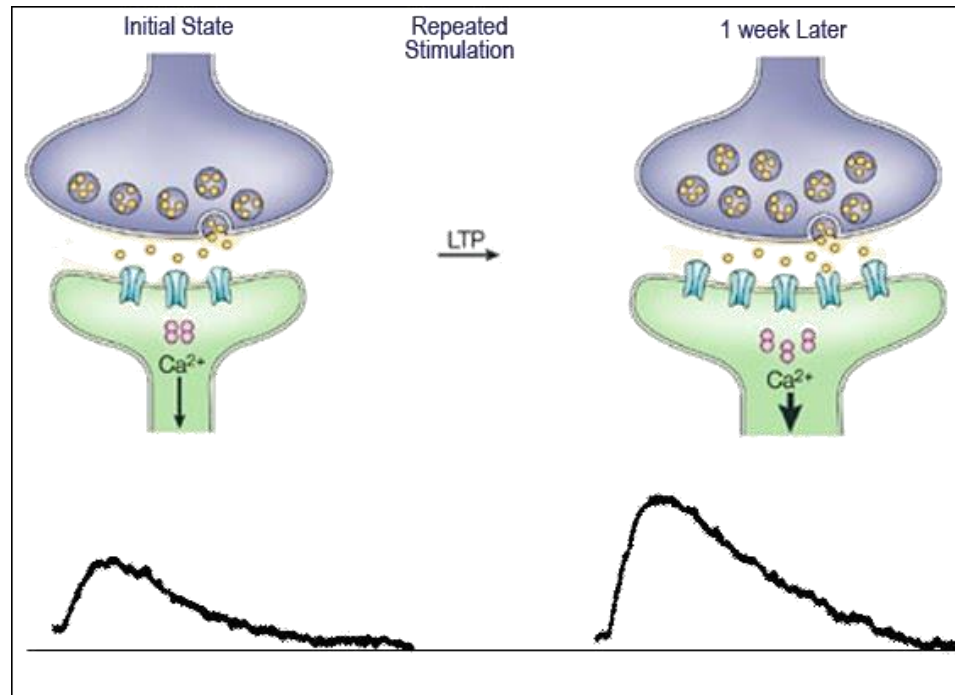
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Mechanism of action LTP / LDP

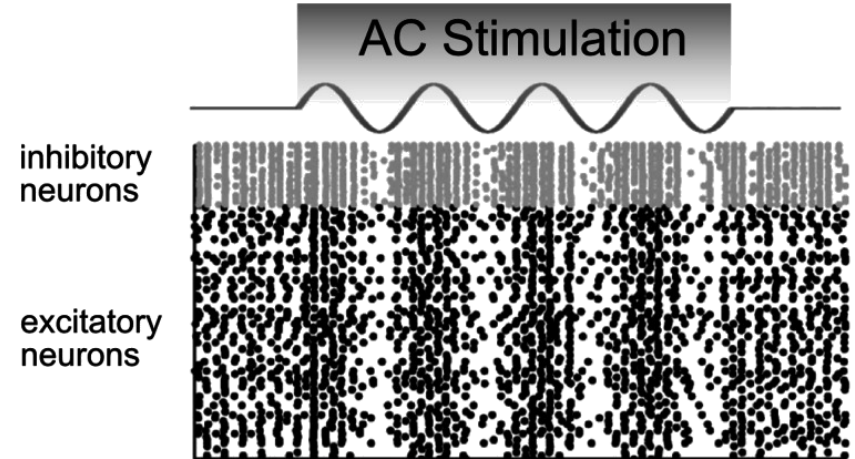
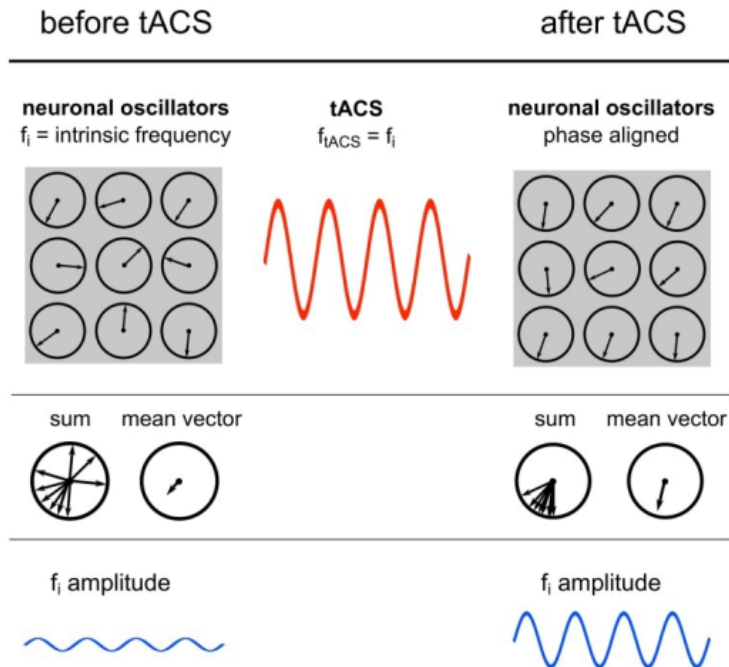
Long Term Potentiation / Long Term Depression

- Persistent increase/decrease in synaptic strength
- Mechanism engaged in learning and memory tasks



Transcranial Alternating Current stimulation (tACS)

- Modulates brain oscillations – synchronization of neuronal firing



Why tES

- Easy to administer
- Non-expensive
- Reliable sham condition
- Less side effects
- Help for medicine resistance patients (mechanism of action)

Thank you for your attention



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