



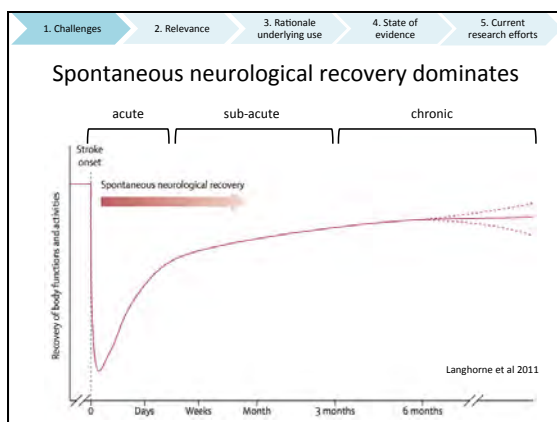
Transcranial direct current stimulation (tDCS) for motor recovery after stroke

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Outline

1. Challenges in stroke recovery and rehabilitation
2. Relevance of tDCS in stroke recovery
3. Rationale underlying use of tDCS
4. State of evidence for tDCS
5. Current research efforts



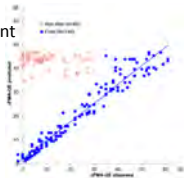
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Proportional Recovery: Amount of recovery is proportional to initial impairment

At 3-6 months post-stroke, survivors achieve approximately 70% of their maximum potential recovery

e.g. Fugl Meyer Assessment of motor impairment

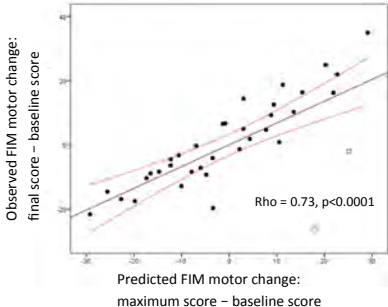
- Max score of assessment = 66
- Baseline score = 6
- Potential/Predicted recovery = $66 - 6 = 60$
- Observed recovery = 70% of 60 = 42



Feng et al 2015; Byblow et al 2015; Prabhakaran et al 2008; Stinear et al 2017; Winters et al 2015

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Replication of Proportional Recovery

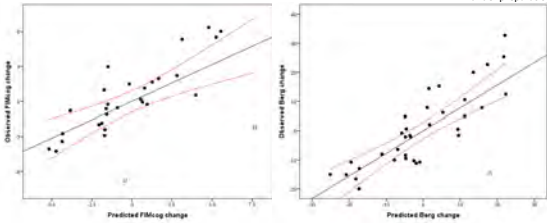


Rho = 0.73, $p < 0.0001$

Cohen et al, under preparation

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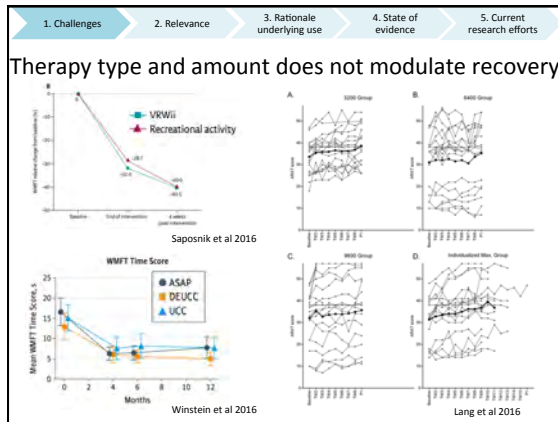
Proportional Recovery also found for aspects of cognition and balance

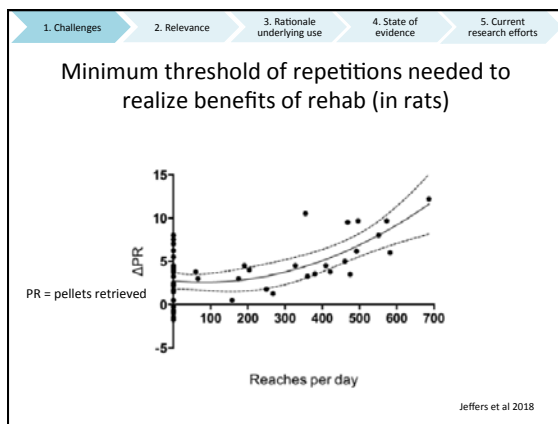


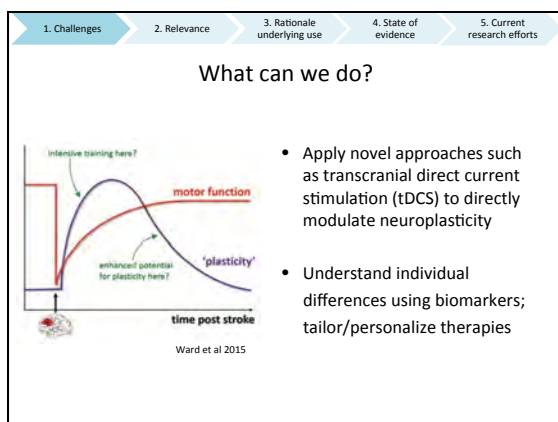
Rho = 0.62, $p < 0.0001$

Rho = 0.63, $p < 0.0001$

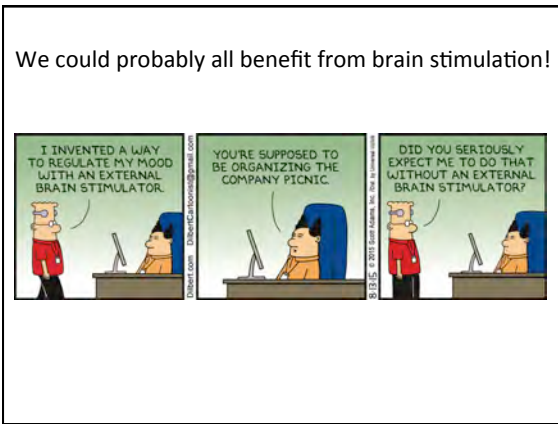
Cohen et al, under preparation







We could probably all benefit from brain stimulation!



1. Challenges

2. Relevance

3. Rationale underlying use

4. State of evidence

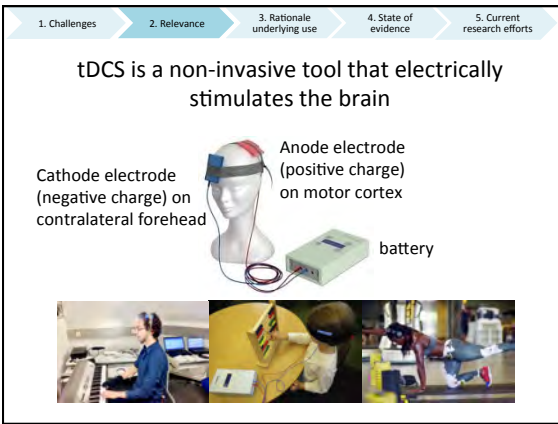
5. Current research efforts

tDCS is a non-invasive tool that electrically stimulates the brain

Cathode electrode (negative charge) on contralateral forehead

Anode electrode (positive charge) on motor cortex

battery



1. Challenges

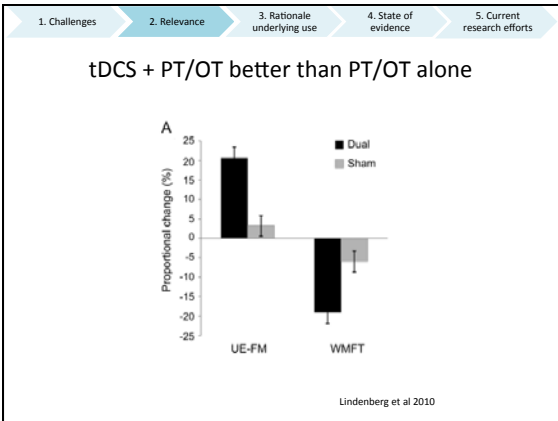
2. Relevance

3. Rationale underlying use

4. State of evidence

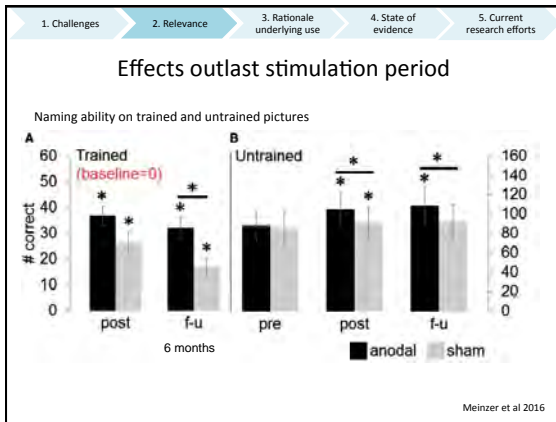
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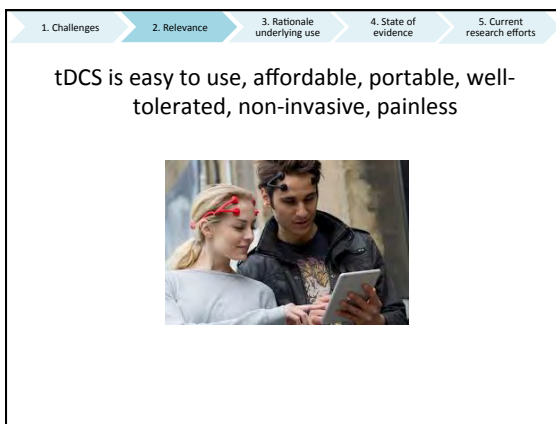
tDCS + PT/OT better than PT/OT alone



Measure	Dual	Sham
UE-FM	~20%	~5%
WMFT	~-20%	~-10%

Lindenberg et al 2010







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Impaired interhemispheric inhibition (IHI) post-stroke

Right hemisphere controls left hand and inhibits left hemisphere (and vice versa) (Ferber et al 1992)

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Impaired IHI leads to overactive contralesional sensorimotor cortex

Grefkes et al 2008

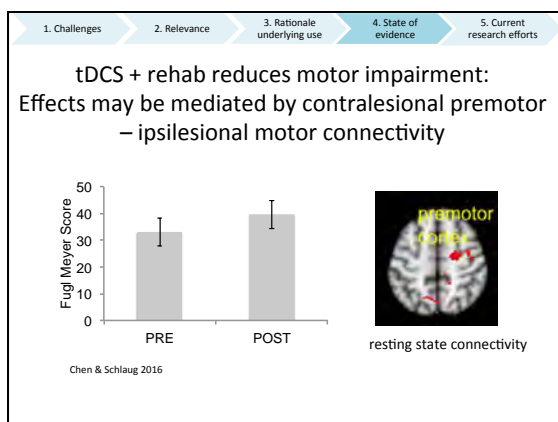
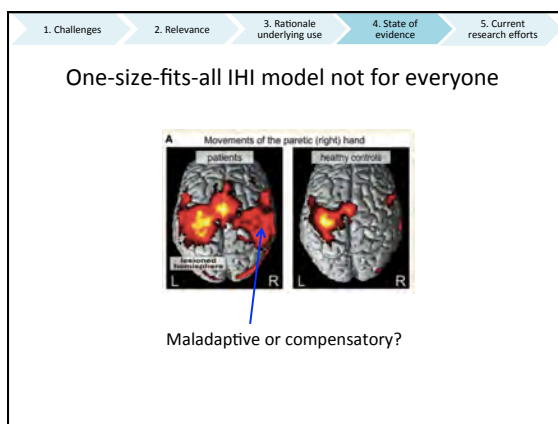
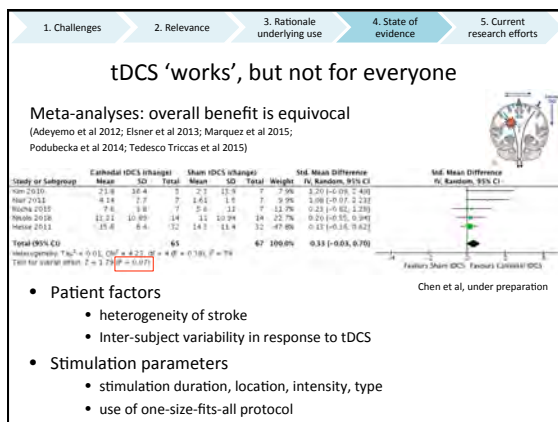
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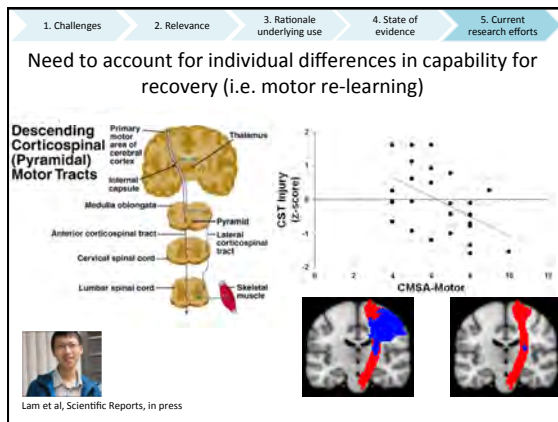
tDCS may rebalance IHI and normalize maladaptive overactivity

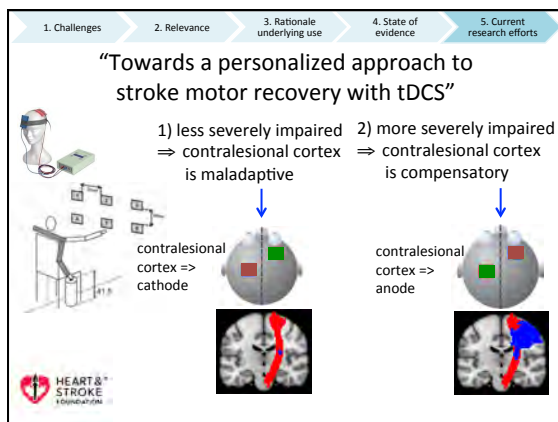
Up-regulate neural activity in ipsilesional cortex

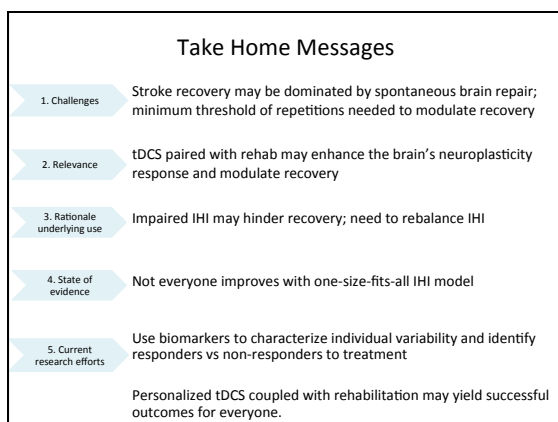
Down-regulate overactivity in contralesional cortex

Schlaug et al 2008









Thank you!

Sunnybrook Research Institute

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- Sandra Black
- Ellen Cohen
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- Alex Kiss
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