

Transcranial direct current stimulation improves sustained attention in breast cancer survivors

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Cancer-related Cognitive Dysfunction

- More than half of cancer survivors report difficulties with cognitive function following completion of treatment
- Self-reported memory complaints likely stem from attentional failures during encoding (Root et al., 2015; 2016)
- Greater intra-individual variability in reaction time on attention tasks, associated with variable and lapsing attention (Bernstein, Catton, & Tannock, 2014)
- Chemo-treated survivors show reductions in brain volume, activity, and connectivity in prefrontal regions (de Ruiter et al., 2011; Deprez et al., 2012)

Study goals:

1. Test feasibility and tolerability of tDCS to prefrontal cortex in breast cancer survivors with cancer-related cognitive dysfunction
2. Test efficacy of prefrontal tDCS to improve sustained attention in breast cancer survivors

Attention Task

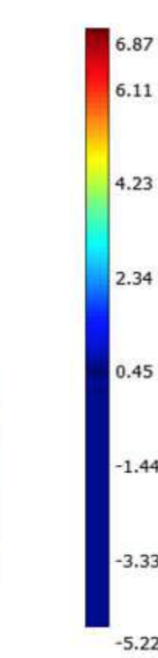
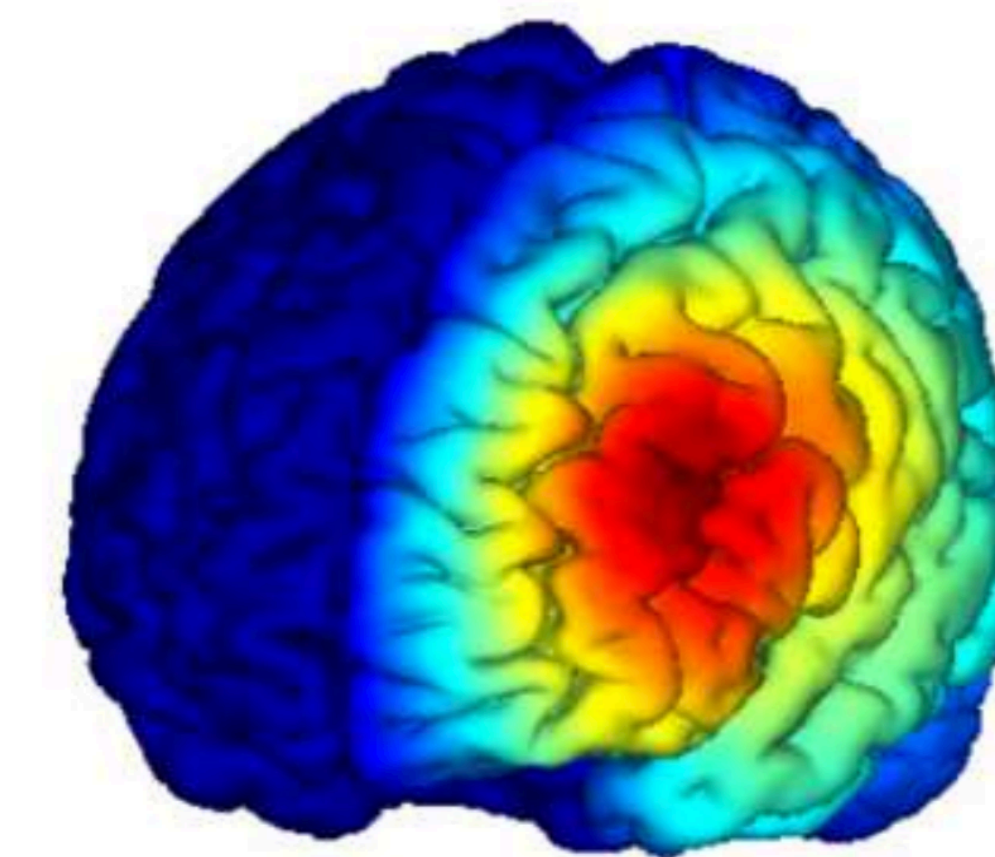
N = 16 breast cancer survivors, age 40-65 yrs
Continuous Performance Test (Conners' CPT II)



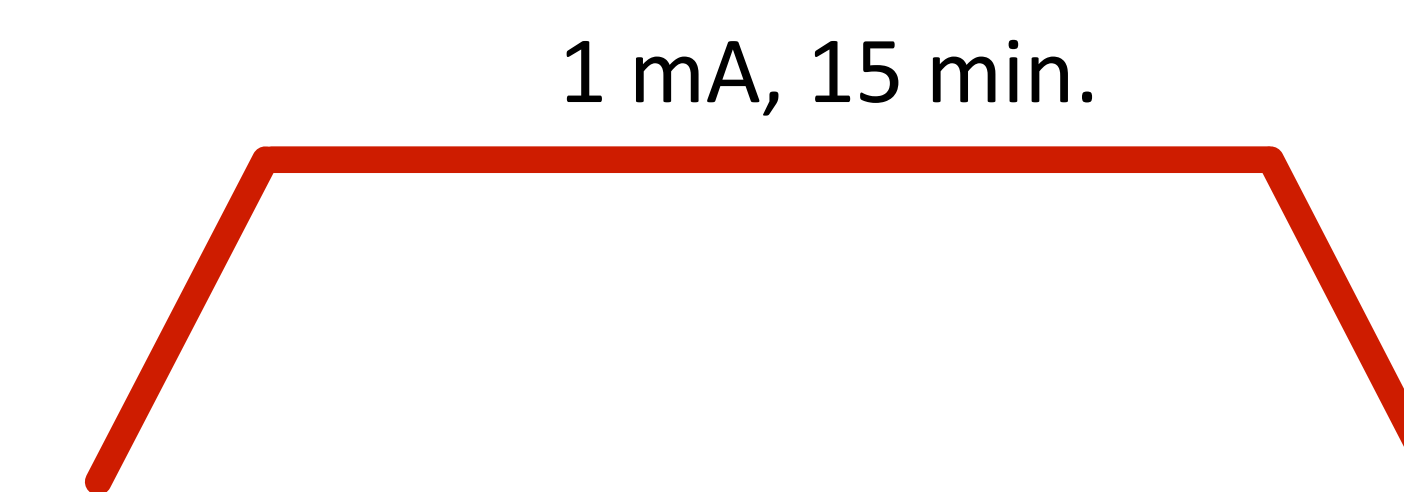
360 trials; 18 blocks with varying ISI: 1s, 2s, 4s
90% target (go), 10% non-target (no-go)

tDCS Methods

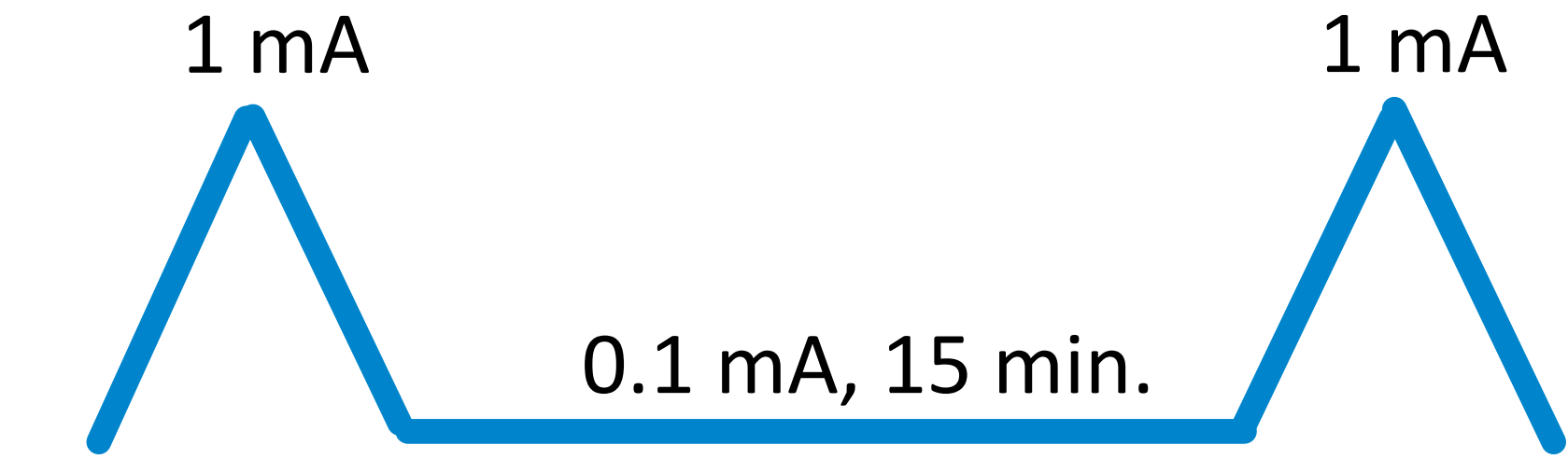
- 1mA steady state current over left DLPFC
- Within-subjects: 2 sessions active, 2 sessions sham



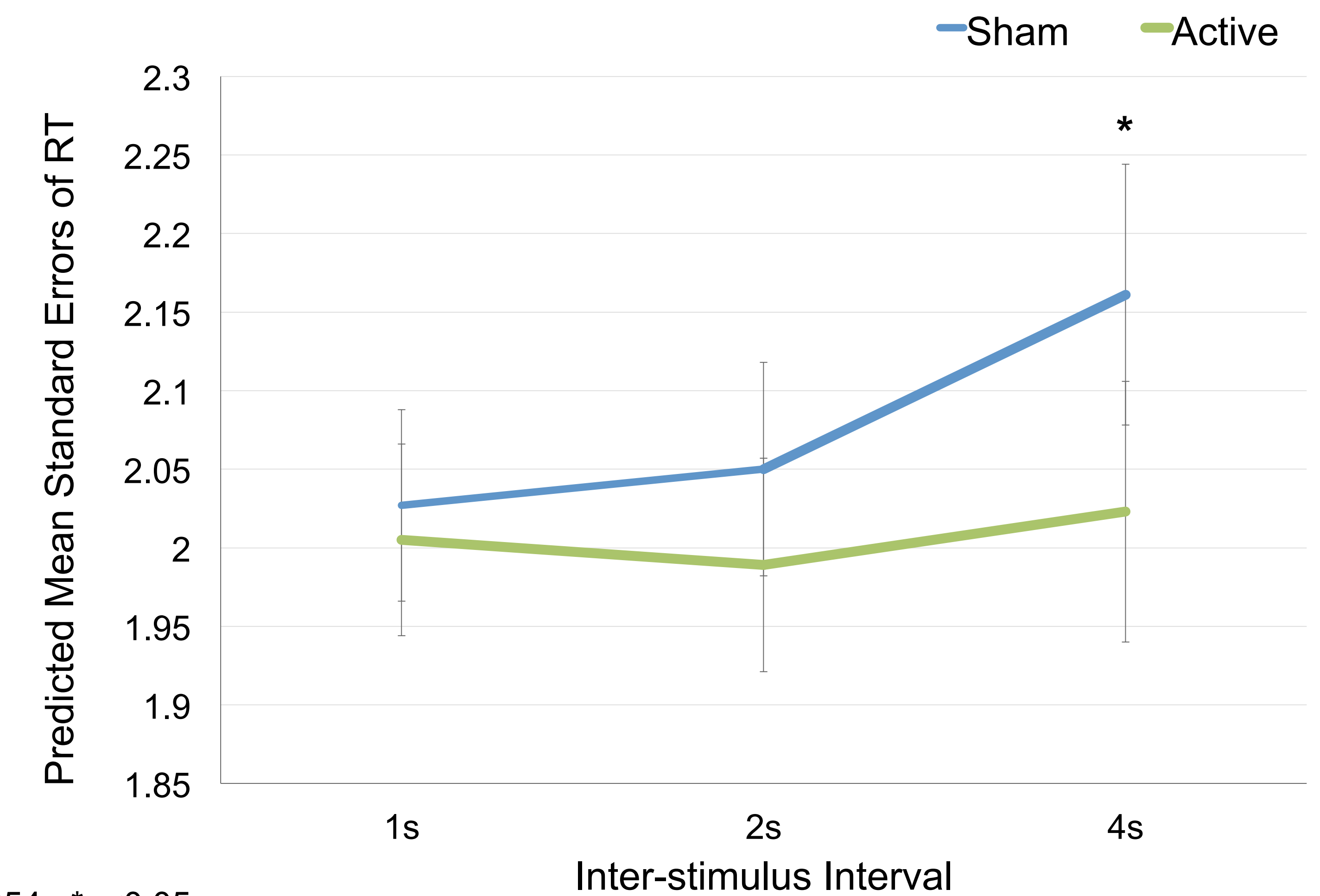
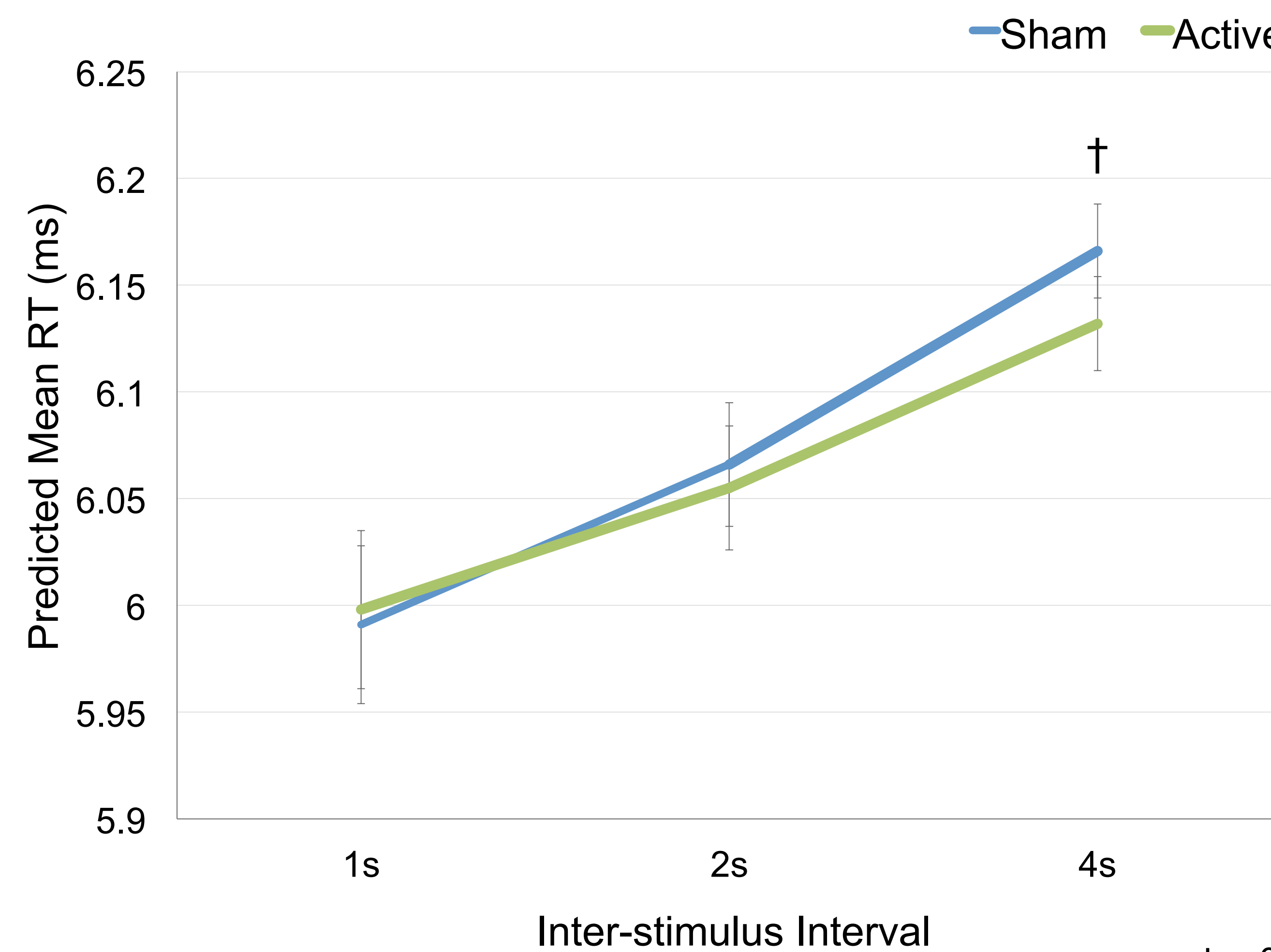
ACTIVE STIMULATION



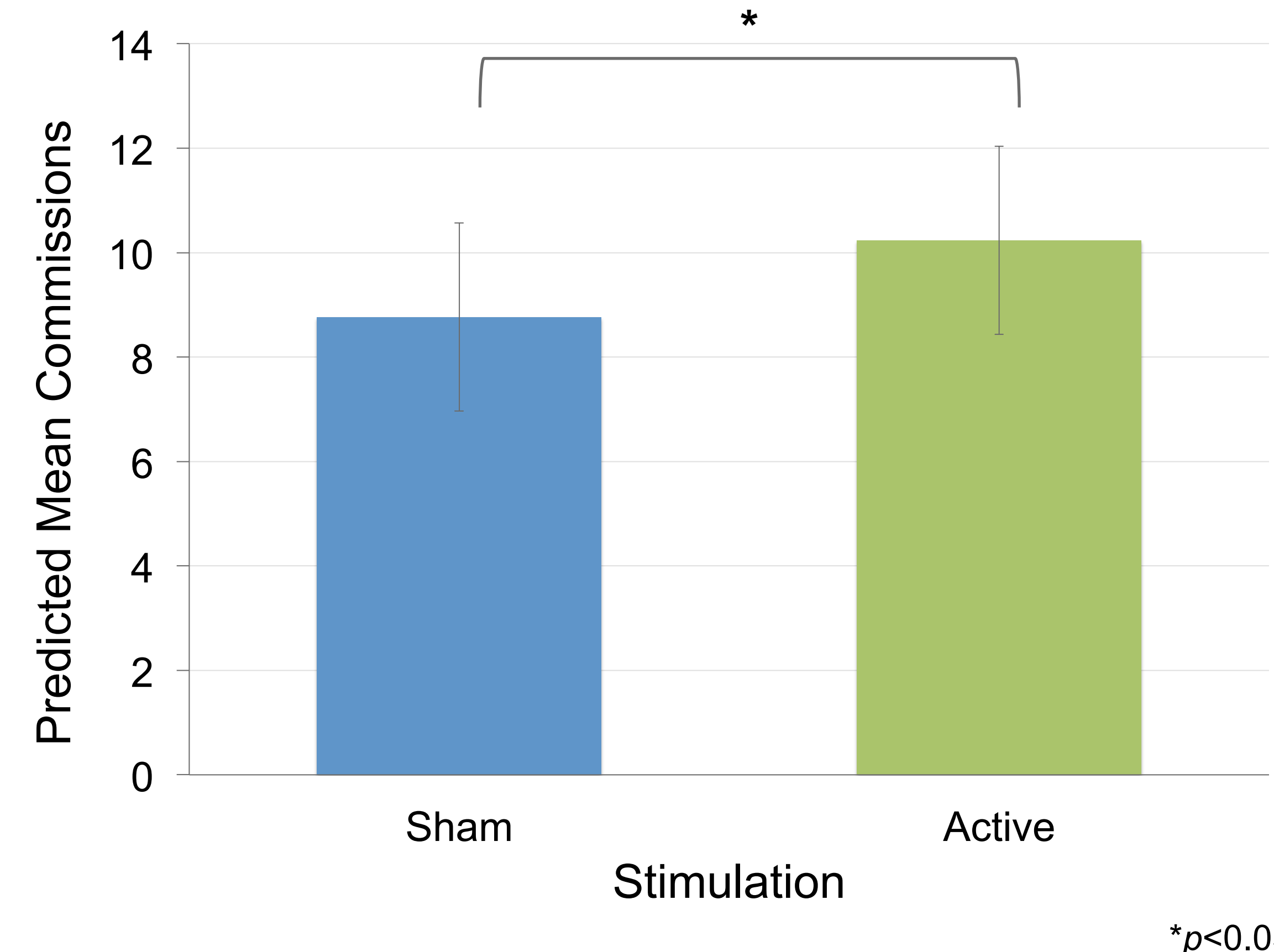
SHAM STIMULATION



DLPFC Stimulation Improves Sustained Attention



Stimulation Increases Commissions



Conclusions and Future Directions

- 89% completed all sessions; greatest challenge to feasibility was multiple in-clinic sessions
- No significant discomfort or adverse effects
- Stimulation of left DLPFC is effective in improving sustained attention performance in cancer survivors
- Unexpected increase in commissions may result from increased speed generalized to non-dominant task, or possible cathodal inhibition of right DLPFC
- Future work should use remotely-supervised tDCS to overcome limitations of feasibility and determine effects of multiple sessions on producing long-term changes and remediate attention deficits in CRC