INTRODUCTION

Thetahburst transcranial magnetic stimulation (TBS) to the right posterior superior temporal sulcus (rpSTS) or the right occipital face area selectively disrupts BOLD responses within face-selective regions, both local and remote to the initial stimulation site (Pitcher et al., 2014). Given this modulation of task-evoked responses, we hypothesized that TBS delivered over the right posterior superior temporal sulcus would selectively disrupt functional connectivity within face-selective regions, as measured by resting state fMRI. We used multi-echo state MRI. We used multi-echo T2 (ME-T2) and MEICA denoising (Kundu et al. 2012) to attempt to remove non-BOLD-weighted noise from our data.

METHODS

Data Collection

16 volunteers, 10 Female
3 MRI sessions on different days
Day 1: High-resolution, T1 weighted anatomical & functional localizer data
Stimulation site 1: Peak voxel for faces > objects contrast in right posterior superior temporal sulcus (rpSTS)
Stimulation site 2: Anatomically defined right hand-knob region (rHk)

Methods

Preprocessing

- Echo 2, TE=27.1 ms, considered standard single echo fMRI run as comparison
- Optimally combined time series is weighted average of 3 echoes
- MEICA denoising

Functional connectivity analysis

- Correlation between each ROI and all other voxels calculated, for each 10-min connectivity analysis
- 3 voxel radius spheres centered on stimulation sites used as ROIs for resting state correlational analysis

RESULTS

- TBS & correlation seed on right posterior superior temporal sulcus
- Correlation to functionally defined regions of interest
  - TBS to rpSTS

Without MEICA denoising, the maps have fewer voxels that cross the same threshold (rpSTS) or more voxels that aren’t in clear spatial clusters (rHk)

TBS to the rpSTS disrupted functional connectivity to the IFPa, IFPa, and OFA, while TBS to a control region, the rHk, did not generate the same pattern or magnitude of disruptions in correlations to the rpSTS

DISCUSSION

These results show that TBS to the rpSTS selectively decreases functional connections to face-selective regions even in the absence of task-evoked responses.

We observe similar changes in normalized group maps and functionally defined regions of interest.

MEICA denoising qualitatively improves the group activation maps and additional work with quantified the changes.

While these results matched our initial hypothesis, some results use a liberal statistical threshold. We plan to investigate more ways to remove non-neural noise from these data and more precisely compare subject-specific regions of interest to reduce noise due to spatial inaccuracies.

REFERENCES


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