In healthy, never-depressed individuals, EEG alpha power localized to multiple ventral and prefrontal cortical areas correlated with fluctuations across multiple days in reported depression symptom severity. No such relationships were found for individuals with current or prior MDD.

**Background**

- Mood dysregulation and variability are likely important factors underlying mood-disorder etiology.
- However, the neural circuitry that contributes to mood variability remains unclear.
- Alpha oscillations are important in functional inhibition of neural activity and play a role in synchronizing large-scale networks, and EEG localization techniques (i.e., sLORETA) can estimate intracortical sources of alpha power.
- The aim of the present study was to determine which intracortical sources of alpha power predict mood variability over a several-week period.

**Methods**

**Participants (N = 306)**
- MDD+ participants (N=143) met criteria for a lifetime history of major depression, but no other Axis I disorder besides dysthymia.
- MDD- participants (N=163) never met criteria for major depression or any other Axis I disorder.

**EEG data & source estimates (standardized Low-Resolution Electromagnetic Tomography, sLORETA)**
- 64-channel EEG was recorded 8 times within a 2 weeks – four days, two sessions each day. Results here include all 8 sessions of eyes-closed resting data (4 minutes per recording session).
- Artifacts were identified visually and with custom MATLAB-based scripts.
- sLORETA estimated the three-dimensional power of EEG sources for the alpha band (8-12Hz) for each session.
- sLORETA estimates were normalized by dividing power at a voxel by the standard deviation of overall power across all voxels (sum of all voxels = 1).
- Finally, sLORETA values were averaged across all 8 recordings.

**Mood variability**
- The standard deviation of overall score in the Beck Depression Inventory (BDI) over a several-week period.
- Spearman rank-order correlations were used to determine associations between ventral and prefrontal cortical areas correlated with fluctuations across multiple days in reported depression symptom severity. No such relationships were found for individuals with current or prior MDD.

**Correlational Analyses**
- Spearman rank-order correlations were used to determine associations between ventral and prefrontal cortical areas correlated with fluctuations across multiple days in reported depression symptom severity. No such relationships were found for individuals with current or prior MDD.

**Results**

**Figure 1. Intraclass Correlation Coefficient (ICC) values for all subjects across the 8 EEG recordings**. sLORETA estimates for ventral and prefrontal areas demonstrate the greatest stability across sessions (ICCs > .8).

**Figure 2. Correlation of source localized alpha (8-12Hz) power with the standard deviation of BDI score**. In individuals with a lifetime history of depression, less alpha power (presumably greater cortical activity) in multiple ventral cortical areas predicted greater fluctuation in BDI score. No such relationship was found for the group with a history of MDD.

**Discussion**

- sLORETA estimates of lower alpha power in ventral prefrontal regions predicts variability in depressive symptoms in healthy, never-depressed individuals.
- These findings build on prior literature related to pathophysiological mechanisms and potential treatment of the disorder.
- Deficits in functional connectivity in depressed individuals, specifically in regions overlapping the present findings.
- Subgenual cingulate (BA 25) is implicated in emotional processing and autonomic control, and is a target for deep-brain stimulation therapy.
- Findings support the promise of future prospective research to elucidate the diagnostic and prognostic significance of these EEG alpha cortical sources.

**References**


This work was supported in part by NIMH R01-MH066092 (to J.B.A.), by the National Science Foundation Graduate Research Fellowship program (to M.R.G.). Reprints available at www.psychofizz.org Contact: mgoldstein@email.arizona.edu