Can resting-state patterns predict aberrant salience in early psychosis spectrum?

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**Background:** The theory of aberrant salience suggests that symptoms of psychosis arise from the incorrect assignment of salience to internal and external stimuli. Previous studies have shown that patients with recent onset psychosis (ROP) as well as patients with a clinical high risk for psychosis (CHR) exhibit aberrant salience. Fronto-striatal networks represent the neural basis of salience attribution and reward processing that is affected in psychosis and CHR patients. The aim of this study was to use functional connectivity-based multivariate pattern analysis (MVPA) to classify good performance on a salience attribution task as measured by low implicit aberrant salience (low IabS) and poor performance as measured by high implicit aberrant salience (high IabS) in early psychosis spectrum (EPS) patients by applying a model generated in healthy controls (HCs).

**Methods:** 30 HCs, 16 ROP and 18 CHR patients underwent resting-state fMRI (RS-fMRI) and participated in the salience attribution test (SAT) outside the scanner as part of the PRONIA-study (Personalized Prognostic Tools for Early Psychosis Management). The two patient groups were combined into an EPS group (n = 34) because they showed no difference in SAT performance in previous studies. On the SAT, subjects had to implicitly learn the relationship between cue-image categories and high or low reward contingency. IabS was defined as the abnormal speeding of responses on task-irrelevant cue trials with a reward probability of 50%. Good SAT-performers (low IabS) and poor SAT-performers (high IabS) were identified via median split based on the HC median within each study group. The multivariate patter recognition methods support vector was used to classify good vs. poor SAT performers by applying L1-regularized L2-loss support vector machine.

**Results:** The classifier was able to differentiate between good and poor SAT-performers in HCs with an accuracy of 80%. The discriminative pattern included connections between orbitofrontal and striatal, orbitofrontal and insula, globus pallidus and parietal, and caudate and temporal regions. Applying this model to EPS data yielded a lower classification performance of 62%.

**Conclusions:** To the best of our knowledge, this is the first study using RS connectivity patterns to predict aberrant salience in good vs. poor performance across HC and EPS individuals. The difficulties in applying the model generated in HCs to EPS patients could be due to altered brain functioning in EPS. Connectivities that were highly informative for the classification in HCs might be altered in EPS in such a way that they hold no information for the classification of good vs. poor SAT-performers. The high classification accuracy of 80% when distinguishing good from poor performers based on RS data in HCs severs as a promising finding in the aberrant salience research domain and supports further investigations in EPS patients.