

Poster presentation

Abnormal Temporal-Difference signals in a Pavlovian Conditioning task in Depressive Illness and effects of Antidepressant Medication

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Background

Various computational models such as Temporal-Difference (TD) [1] and Kalman filter [2] have been developed to study the behaviour of animals during learning about rewards and punishments. Recent studies have shown TD related prediction error (PE) signals in the ventral striatum (VS), orbitofrontal cortex (OFC) and anterior cingulate [3]. These brain regions are repeatedly reported to be both structurally and functionally abnormal in depressive illness [4]. Consequently, it was hypothesised that such abnormalities may be associated with abnormal PE signals in depressed patients.

Materials and methods

15 healthy controls and 15 depressed patients matched for sex and age were scanned using event-related fMRI and appetitive Pavlovian conditioning. To explore the potential confound, as to whether the abnormal signals if any, found in the patients are due to the illness or antidepressant medication they receive, controls were given 20 mg of citalopram for 3 days and re-scanned

Results

Activations in the VS, mid cingulate and OFC, correlated significantly with PE signals predicted by the TD model. Consistent with our hypothesis, error signals were decreased in the ventral striatum and increased in the subgenual cingulate and hippocampus in patients when compared to unmedicated healthy controls. When medicated

controls were compared with patients, decreased activation in the VS disappeared, suggesting a medication effect. However, increased hippocampus and subgenual cingulate activity in patients survived, suggesting an effect due to illness and not medication.

Conclusions

These results suggest that both depressive illness, and the anti-depressant medication used to treat the illness, alters PE signals.

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