A Precision Medicine Approach to Antidepressant Treatment in Depression

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Background

Every year in England over 800,000 patients present to their GP with a new episode of depression.

Antidepressants are effective in treating depression but have a slow clinical onset of action, taking 4 to 6 weeks before changes in mood become apparent.

Many patients do not respond to the first medication prescribed and must try a series of different drugs, one after the other.

This often results in delays of many months before patients return to good mental health.

Antidepressant medication improves mood by causing patients to interpret emotional information in a more positive way (e.g. "the glass is half full rather than half empty").

The Primary Care Emotional Test Battery (PC-ETB) is a set of computer-based tasks designed specifically to measure this change in processing of emotional information.

We assessed whether the PC-ETB could be used to predict, after only 7 days of treatment, whether a patient's mood would improve after 6 weeks of antidepressant treatment.

The ability to predict treatment response after only 7 days would significantly reduce the time to remission for depressed patients.

Methods

74 depressed patients were recruited from 10 GP practices in England.

Patients completed the PC-ETB before starting the antidepressant citalopram and then again 7-9 days later.

Depressive symptoms were measured using the QIDS-SR questionnaire before treatment, at 7-9 days, and after six weeks of treatment.

PC-ETB and QIDS-SR scores from the baseline and day 7-9 were combined using a machine learning algorithm to predict whether the patient would respond to treatment at 6 weeks (treatment response = >50% reduction in QIDS-SR score from baseline to week 6).

Leave-one-out validation was used (feature selection and training on all but 1 sample, testing on left out sample)

PC-ETB Test

500MS
500MS
500MS

Which emotion is shown on the face?

Study Design

Week 0 — PC-ETB QIDS-SR — Citalopram

Week 1 — PC-ETB QIDS-SR

Week 6 — QIDS-SR
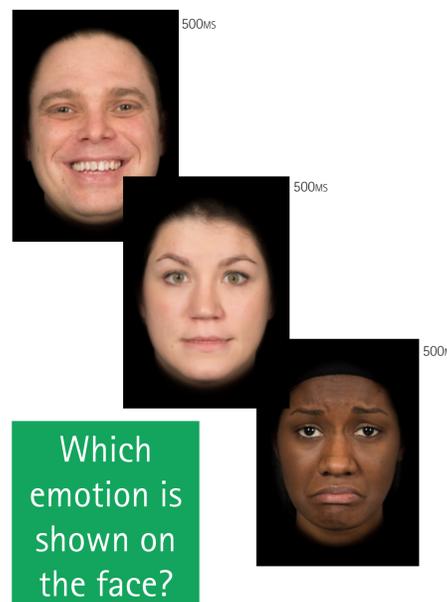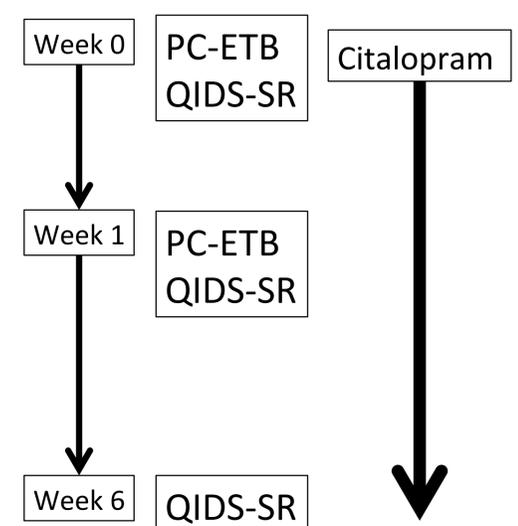
Results

Data from 58 patients

Citalopram only improved mood in 37% of patients treated

	Patient Responded to Treatment	Patient Did Not Respond to Treatment
PC-ETB Predicted Patient Would Respond	13	5
PC-ETB Predicted Patient Would Not Respond	9	31

78% of patients with a negative PC-ETB test did not respond to treatment
72% of patients with a positive PC-ETB test did respond to treatment

Conclusion

Changes in emotional processing provide a sensitive prediction of response to citalopram in primary care patients.

The PC-ETB system shows considerable promise as a tool to improve the treatment of depression by reducing the time for the majority of patients to return to good mental health.