Predicting treatment outcome in depression: combining EEG and personality.

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Abstract

In recent years, the development of guidelines has supported the application of evidence-based medicine in the treatment of major depressive disorder. However, it is less clear which of multiple treatments that are available at a certain level of severity and given the outcome of previous treatments (if any), is suitable for a given the patient. This question is answered by research on personalized medicine. Personalized medicine requires predictive models with high sensitivity and high specificity. One way to attain this goal is to use data mining techniques with adjustable weighting of false positive versus false negative predictions. Another way is to combine multiple predictors from different levels of observation. In the present study, we applied decision tree data mining, with weighted confusion matrices, to develop a predictive model of treatment outcome. The data consisted of EEG and NEO-FFI personality baseline assessment and the clinical outcome of 76 patients with MDD, treated with a combination of rTMS and psychotherapy. Given the high response rate (79%), we only accepted models with ≥ 90% sensitivity. The final model attained 93% sensitivity and 62.5% specificity (overall accuracy 87%). As expected, the model combined personality (low Openness, high Anxiety) and EEG parameters (excess slow waves) to predict treatment non-response. The subgroup that showed excess slow wave power probably consisted of patients with impaired vigilance regulation. On the other hand, high beta power predicted favorable treatment outcome. High beta power might indicate the presence of onset-stage, probably anxious, symptoms.

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