Electroencephalographic biomarkers as predictors of methylphenidate response in attention-deficit/hyperactivity disorder


Abstract

EEG biomarkers have shown promise in predicting non-response to stimulant medication in ADHD and could serve as translational biomarkers. This study aimed to replicate and extend previous EEG biomarkers. The international Study to Predict Optimized Treatment for ADHD (iSPOT-A), a multi-center, international, prospective open-label trial, enrolled 336 children and adolescents with ADHD (11.9 yrs; 245 males; prescribed methylphenidate) and 158 healthy children. Treatment response was established after six weeks using the clinician rated ADHD-Rating Scale-IV. Theta/Beta ratio (TBR) and alpha peak frequency (APF) were assessed at baseline as predictors for treatment outcome. No differences between ADHD and controls were found for TBR and APF. 62% of the ADHD group was classified as a responder. Responders did not differ from non-responders in age, medication dosage, and baseline severity of ADHD symptoms. Male-adolescent non-responders exhibited a low frontal APF (Fz: R = 9.2 Hz vs. NR = 8.1 Hz; ES = 0.83), whereas no effects were found for TBR. A low APF in male adolescents was associated with non-response to methylphenidate, replicating earlier work. Our data suggest that the typical maturational EEG changes observed in ADHD responders and controls are absent in non-responders to methylphenidate and these typical changes start emerging in adolescence.

CLINICAL TRIALS REGISTRATION: