Effects of multisensory stimuli on inhibitory control in adolescent ADHD: It is the content of information that matters

Witold X. Chmielewski; Angela Tiedt; Annet Bluschke; Gabriel Dippel; Veit Roessner; Christian Beste

NeuroImage: Clinical
Volume 19, 2018, Pages 527-537
DOI: https://doi.org/10.1016/j.nicl.2018.05.019

Abstract

Even though deficits in inhibitory control and conflict monitoring are well-known in ADHD, factors that further modulate these functions remain to be elucidated. One factor that may be of considerable importance is how inhibitory control is modulated by multisensory information processing. We examined the influence of concurrent auditory conflicting or redundant information on visually triggered response inhibition processes in adolescent ADHD patients and healthy controls. We combined high-density event-related potential (ERP) recordings with source localization to delineate the functional neuroanatomical basis of the involved neurophysiological processes. In comparison to controls, response inhibition (RI) processes in ADHD were compromised in conflicting conditions, but showed no differences to controls when redundant or no concurrent auditory information was presented. These effects were reflected by modulations at the response selection stage (P3 ERP) in the medial frontal gyrus (BA32), but not at the attentional selection (P1, N1 ERPs) or resource allocation level (P2 ERP). Conflicting information during RI exerts its influences in adolescent ADHD via response selection mechanisms, but not via attentional selection. It is not the mere presence of concurrent information, but the presence of conflicting information during RI that may destabilize goal shielding processes in medial frontal cortical regions, by means of increasing the automaticity of response tendencies. The occurring RI deficits might relate to the increased impulsivity in adolescent ADHD and a corresponding vulnerability to react to an increased automaticity of prepotent response tendencies. ADHD patients show a bias to a specific content of information which can modulate inhibitory control.