Abstract

Background
Attention deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder characterized by deficits in cognitive and emotional self-control. Optical technique acquisitions, such as near infrared spectroscopy (NIRS), seem to be very promising during developmental ages, as they are non-invasive techniques and less influenced by body movements than other neuroimaging methods. Recently, these new techniques are being widely used to measure neural correlates underlying neuropsychological deficits in children with ADHD.

Methods
In a short series of articles, we will review the results of functional NIRS (fNIRS) studies in children with ADHD. The present brief review will focus on the results of the fNIRS studies that investigate cortical activity during neuropsychological and/or emotional tasks.

Results
According to the reviewed studies, children and adolescents with ADHD show peculiar cortical activation both during neurological and emotional tasks, and the majority of the reviewed studies revealed lower prefrontal cortex activation in patients compared to typically developmental controls.

Limitations
A consistent interpretation of these results is limited by the substantial methodological heterogeneity including patients’ medication status and washout period, explored cerebral regions, neuropsychological tasks, number of channels and sampling temporal resolutions.

Conclusions
fNIRS seems to be a promising tool for investigating neural substrates of emotional dysregulation and executive function deficits in individuals with ADHD during developmental ages.