ADHD 24/7: Circadian Clock Genes, Chronotherapy and Sleep/Wake Cycle Insufficiencies in ADHD

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Abstract

OBJECTIVES:
The current paper addresses the evidence for circadian clock characteristics associated with Attention-Deficit Hyperactivity Disorder (ADHD), and possible therapeutic approaches based on chronomodulation through bright light therapy.

METHODS:
We review the data reported in ADHD on genetic risk factors for phase-delayed circadian rhythms and on the role of photic input in circadian re-alignment.

RESULTS:
Single nucleotide polymorphisms (SNPs) in circadian genes were recently associated with core ADHD symptoms, increased evening-orientation and frequent sleep problems. Additionally, alterations in exposure and response to photic input may underlie circadian problems in ADHD. Bright light (BL) therapy was shown to be effective for re-alignment of circadian physiology toward morningness, reducing sleep disturbances and bringing overall improvement in ADHD symptoms. The susceptibility of the circadian system to phase shift by timed BL exposure may have broad cost-effective potential implications for the treatment of ADHD.

CONCLUSIONS:
We conclude that further research of circadian function in ADHD should focus on detection of genetic markers (e.g., using human skin fibroblasts) and development of BL-based therapeutic interventions.