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Oxidative Stress and ADHD: A Meta-Analysis

Nidhin Joseph¹, Yanli Zhang-James¹, Andras Perl¹, and Stephen V. Faraone¹

¹State University of New York Upstate Medical University, Syracuse, USA

Abstract

Objective—To clarify the role of oxidative stress and antioxidant activity in ADHD.

Method—We examined the association of ADHD and oxidative stress by applying random effects meta-analysis to studies of oxidative stress and antioxidant status in medication naive patients with ADHD and controls.

Results—Six studies of a total of 231 ADHD patients and 207 controls met our selection criteria. The association between ADHD and antioxidant status was not significant. We found a significant association between ADHD and oxidative stress that could not be accounted for by publication bias. The significant association lost significance after correcting for intrastudy clustering. No one observation accounted for the positive result.

Conclusion—These results are preliminary given the small number of studies. They suggest that patients with ADHD have normal levels of antioxidant production, but that their response to oxidative stress is insufficient, leading to oxidative damage.

Keywords

ADHD, meta-analysis

Prior research suggests that oxidative stress predisposes to a diverse range of psychiatric conditions, including schizophrenia, bipolar disorder, major depressive disorder, and anxiety disorders (Ng, Berk, Dean, & Bush, 2008). Humans face an “oxygen paradox” (Davies, 1995). We need oxygen to survive, but an increased quantity of free oxygen radicals causes cellular pathologies that lead to disease and aging. During cellular metabolism, the normal oxidation–reduction reactions that create energy lead to the formation of toxic metabolic by-products called oxidants or reactive oxygen species (ROS). These by-products of normal oxidation–reduction reactions are highly unstable and create oxidative stress, which

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Corresponding Author: Stephen V. Faraone, State University of New York Upstate Medical University, 750 East Adams St., Syracuse, NY 13210, USA. sfaraone@childpsychresearch.org

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