Review

The relationship between mercury and autism: A comprehensive review and discussion

Janet K. Kern, David A. Geier, Lisa K. Sykes, Boyd E. Haley, Mark R. Geier

Institute of Chronic Illnesses, Inc., 14 Redgate Court, Silver Spring, MD, 20905 USA
Council for Nutritional and Environmental Medicine, Mo i Rana, Norway
CoMeD, Inc., 14 Redgate Court, Silver Spring, MD, 20905 USA
University of Kentucky, 410 Administration Drive, Lexington, KY, 40506 USA

Abstract

The brain pathology in autism spectrum disorders (ASD) indicates marked and ongoing inflammatory reactivity with concomitant neuronal damage. These findings are suggestive of neuronal insult as a result of external factors, rather than some type of developmental mishap. Various xenobiotics have been suggested as possible causes of this pathology. In a recent review, the toxic environmental compounds suspected of causing autism and learning disabilities were listed and they included: lead, methylmercury, polychlorinated biphenyls, organophosphate pesticides, organochlorine pesticides, endocrine disruptors, automotive exhaust, polycyclic aromatic hydrocarbons, polybrominated diphenyl ethers, and perfluorinated compounds. This current review, however, will focus specifically on mercury exposure and ASD by conducting a comprehensive literature search of original studies in humans that examine the potential relationship between mercury and ASD. Categorizing, summarizing, and discussing the published research that addresses this topic. This review found 91 studies that examine the potential relationship between mercury and ASD from 1999 to February 2016. Of these studies, the vast majority (74%) suggest that mercury is a risk factor for ASD, revealing both direct and indirect effects. The preponderance of the evidence indicates that mercury exposure is causal and/or contributory in ASD.

© 2016 The Author(s). Published by Elsevier GmbH. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

Contents

1. Introduction ................................................................. 9
2. Brain biomarkers and mercury levels in children with ASD .................................................. 9
3. Human tissue mercury levels and ASD symptom severity ................................................. 10
4. Body tissues studies that examine mercury levels in ASD vs. controls .................................. 11
5. Porphyria biomarkers of mercury body burden and ASD severity .................................... 11
6. Human tissue studies that show an increased susceptibility to mercury (or “pro-oxidant environmental toxins”) in ASD ................................................................. 13
7. Epidemiological studies that examine Thimerosal in vaccines as a risk factor for ASD .................................................. 14
8. Epidemiological studies that examine mercury in RhoGam as a risk factor for ASD ............ 16
9. Epidemiological studies that examine mercury in the air as a risk factor for ASD ............. 18
10. Epidemiological studies that examine mercury from other sources as a risk factor for ASD .................................................. 19
11. Discussion ................................................................. 19
11.1. Mercurial compounds and toxicity .................................................................................. 19
11.2. Other neurotoxicants ....................................................................................................... 19
11.3. Brain pathology and susceptibility .................................................................................. 19
11.4. Neurodevelopmental disorders in general ....................................................................... 20

* Corresponding author at: Institute of Chronic Illnesses, Inc., 14 Redgate Court, Silver Spring MD, 20905 USA.
E-mail address: jkern@dlwair.net (J.K. Kern).

http://dx.doi.org/10.1016/j.jtemb.2016.06.002
0946-672X © 2016 The Author(s). Published by Elsevier GmbH. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).