

Altered Heavy Metals and Transketolase Found in Autistic Spectrum Disorder

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Abstract Autism and autism spectrum disorder (ASD) are developmental brain disorders with complex, obscure, and multifactorial etiology. Our recent clinical survey of patient records from ASD children under the age of 6 years and their age-matched controls revealed evidence of abnormal markers of thiol metabolism, as well as a significant alteration in deposition of several heavy metal species, particularly arsenic, mercury, copper, and iron in hair samples between the groups. Altered thiol metabolism from heavy metal toxicity may be responsible for the biochemical alterations in transketolase, and are mechanisms for oxidative stress production, dysautonomia, and abnormal thiamine homeostasis. It is unknown why the particular metals accumulate, but we suspect that children with ASD may have particular trouble excreting thiol-toxic heavy metal species, many of which exist as divalent cations. Accumulation or altered mercury clearance, as well as concomitant oxidative stress, arising from redox-active metal and arsenic toxicity, offers an intriguing component or possible mechanism for oxidative stress-mediated neurodegeneration in ASD patients. Taken together, these factors may be more important to the etiology of this symptomatically diverse disease spectrum and may offer insights into new treatment approaches and avenues of exploration for this devastating and growing disease.

Keywords Transketolase · Hair · Heavy metal · Copper · Iron · Mercury · Arsenic · Divalent cation · Transport · Autistic spectrum disorder · Mitochondria · Oxidative stress

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