

A Prospective Blinded Evaluation of Urinary Porphyrins Verses the Clinical Severity of Autism Spectrum Disorders

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A prospective, blinded study evaluated the relationship between autism spectrum disorder (ASD) severity measured by Childhood Autism Rating Scale (CARS) scores and urinary porphyrins among a cohort of participants ($n = 26$). LabCorp (CLIA-approved) tested for uroporphyrins, heptacarboxylporphyrins, hexacarboxylporphyrins, pentacarboxylporphyrins, coproporphyrin (cP) I, and cP III levels. Participants with severe ASD had significantly increased cP I, cP III, and total cP levels in comparison to participants with mild ASD. A significant correlation was observed between increasing cP levels and CARS scores. Significant correlations were also noted for comparative urinary porphyrin testing between LabCorp and the Laboratoire Philippe Auguste (ISO-approved) for total cP. Finally, total cP measured at LabCorp was found to significantly correlate with precoproporphyrin (a specific porphyrin marker for mercury toxicity) measured at the Laboratoire Philippe Auguste. Since urinary porphyrin testing is clinically available, relatively inexpensive, and noninvasive, it may be used to help suggest whether heavy metal toxicity is associated with ASD.

Nataf et al. (2006) were the first investigators to describe elevations in specific urinary porphyrin metabolites in a cohort of subjects diagnosed with autism spectrum disorders (ASD). These investigators observed that urinary porphyrins,

pentacarboxylporphyrin (5cxP), precoproporphyrin (prcP), and total coproporphyrins (cP) (I + III), which are associated with increased mercury (Hg) body burden, were significantly elevated in subjects diagnosed with autism ($n = 106$) relative to controls. In contrast, other urinary porphyrin metabolite levels were similar among subjects diagnosed with autism in comparison to controls. Further, these investigators observed that 5cxP, prcP, and total cP (I + III) were reported to increase across the ASD spectrum from mild to severe clinical symptoms (Asperger's disorder < pervasive developmental delay—not otherwise specified (PDD-NOS) < autism < autism + epilepsy), whereas other urinary porphyrin metabolites were not found to significantly fluctuate in correspondence with ASD severity. Finally, these investigators observed that *meso*-2,3-dimercaptosuccinic acid (DMSA)-based chelation therapy significantly decreased urinary prcP and total cP (I + III) levels in a cohort of subjects diagnosed with autism.

Subsequent studies on cohorts of subjects diagnosed with ASD in the United States by Geier and Geier (2006, 2007b), in France by Nataf et al. (2008), and in Australia by Austin and Shandley (2008) have revealed comparable results. In addition, another recent study by Geier et al. (2009) evaluated urinary porphyrin metabolites in a prospective, blinded cohort study of subjects diagnosed with ASD. The study evaluated ASD severity based upon Childhood Autism Rating Scale (CARS) scores calculated prior to blind laboratory testing for urinary porphyrins. It was observed that study subjects with a severe ASD diagnosis in comparison to study subjects with a mild ASD diagnosis had significantly increased urinary porphyrin levels of 5cxP, prcP, and total cP (I + III), whereas other urinary porphyrin levels were similar in both groups. In addition, regression analyses showed significant relationships between increasing CARS scores and rising urinary 5cxP and prcP levels. These correlations were absent for other urinary porphyrin metabolites examined. Finally, it was observed that increasing urinary 5cxP and prcP levels were significantly correlated with impaired glutathione detoxification (Geier et al., 2009).

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