Volume 20, No. 2 2006

Autism Research Review INTERNATIONAL

A quarterly publication of the Autism Research Institute

Reviewing biomedical and educational research in the field of autism and related disorders

Study implicates heavy metal toxicity as culprit in autism, offers evidence for chelation benefits

High levels of porphyrins in the urine of autistic children implicate heavy metals as a culprit in autism, according to a new study.

Robert Nataf and colleagues measured the urinary porphyrin levels of 269 children with neurodevelopmental disorders, including 106 children with autism. They compared these levels to those of patients with non-neurological disorders, and to levels found in children in the general population.

Porphyrins are precursors of heme, a component of hemoglobin. When key steps in heme synthesis are blocked, excess porphyrins collect and are excreted in the urine. One cause of this metabolic blockade is heavy-metal exposure.

Nataf and colleagues report that concentrations of one porphyrin, coproporphyrin (COPRO), were 2.6 times higher in autistic children than in controls. "The extent of [this] rise," the researchers say, "was comparable to the rise seen in arsenic and mercury exposure." A subgroup of autistic children with epilepsy showed a similar elevation. Surprisingly, children with Asperger syndrome did not have increased levels of COPRO.

Because elevated COPRO can stem from several causes, the researchers also measured levels of precoproporphyrin (PRECOPRO), a metabolite which they note is "specifically linked to heavy metal exposure rather than chemical toxicity or other disease processes." Autistic children, with or without epilepsy, had significantly elevated PRECOPRO levels compared to control children or those with Asperger syndrome. In addition, levels of another marker of heavy metal toxicity (pentacarboxyporphyrin) and its precursors were elevated in both epileptic and non-epileptic children with autism.

"The overall evidence," Nataf and colleagues say, "affirms that at least 53%, and possibly more, of children with autistic disorder excrete excess porphyrin in their urine." Only two other categories of developmentally disabled children, those with epilepsy and those with both mental retardation and epilepsy, had significantly elevated porphyrin levels.

After the researchers completed their analysis, eleven of the autistic children underwent chelation therapy (a procedure which removes heavy metals from the body). Nataf and colleagues compared porphyrin levels before and after chelation, and say that COPRO and PRECOPRO levels dropped significantly in the treated groups but not in autistic controls who did not undergo chelation.

The researchers say, "Our results accord with previous suggestions that heavy metal toxicity might contribute to the pathoetiology of autism, but do not identify the agent involved." However, they say their findings suggest that the underlying cause is interference with an enzyme called UROD, which is powerfully inhibited by mercury.

They also note that excess urinary porphyrin could help to explain the behavior problems seen in autism. High blood levels of porphyrins can cause neurologic disturbances, epilepsy, and autism.

Nataf and colleagues say their findings are preliminary, but conclude, "[G]iven evidence for increasing population exposure to heavy metals including mercury, suggestions of increasing prevalence of autistic disorder, and a statistical association between mercury release and autism rates, one may suspect that environmental toxicity, combined with genetic susceptibility contributes to autism spectrum disorder development."

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"Porphyrinuria in childhood autistic disorder: implications for environmental toxicity," Robert Nataf, Corinne Skorupka, Lorene Amet, Alain Lam, Anthea Springbett, and Richard Lathe, *Toxicology and Applied Pharmacology*, in press. Address: Richard Lathe, Pieta Research P.O. Box 27069, Edinburgh EH10 5YW, UK, rlathe@pieta-research.org.

Confirmation of Wakefield's measles findings reported

When Andrew Wakefield first announced finding a novel form of intestinal inflammation (ileocolonic lymphonodular hyperplasia, or LNH) in autistic children with gastrointestinal symptoms, and tentatively linked this condition to the measles-mumps-rubella (MMR) vaccine, the medical establishment dismissed his findings as uncorroborated. Now, a large-scale study—whose findings were so dramatic that the researchers released their intial data early—is providing that corroboration.

The new study, by Arthur Krigsman and colleagues, involves more than 275 children with regressive autism and gastrointestinal (GI) symptoms. To date, the researchers have analyzed terminal ileum biopsy tissue from 82 patients, and report that 70 of these patients (85%) show evidence of the measles virus in their intestine. Of the samples, 14 have been verified by DNA sequencing.

The researchers conclude, "Preliminary results from this large cohort of pediatric autistic patients with chronic GI symptoms confirm earlier findings of measles virus RNA in the terminal ileum and support an association between measles virus and ileocolitis/LNH."

Commenting to a London paper about the study, UK physician Richard Halvorsen—an expert on childhood vaccines—says, "This is incredibly powerful evidence confirming the link between autism, MMR and bowel disease. The government should withdraw MMR until its safety can be proven, particularly as we have safer and effective alternatives [individual rather than combined vaccines]."

> British vaccine expert Richard Halvorson comments, "This is incredibly powerful evidence confirming the link between autism, MMR and bowel disease," and calls on the British government to withdraw the MMR until its safety can be proven.

Wakefield himself recently published a study in which he and his colleagues evaluated children with regressive autism and GI symptoms, comparing those who had received a single dose of a measles-containing vaccine to those who received multiple doses. This is called a "challenge re-challenge" study. In this type of study, the finding that symptoms recur each time a child is exposed—or that symptoms worsen upon multiple exposures—strongly supports the theory that a particular agent (in this case, the measles vaccine) is linked to these symptoms.

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