Autism and Glutathione

By Dr. Dan Murphy

Although controversial and poorly covered by the media, dozens of well- respected scientific journals have published articles relating the mercury in vaccines to the epidemic of autism. I have listed six such articles in my references for this article (1,2,3,4,5,6). As an example, reference (6), published in the October 2005 issue of the journal *Neuroendrocrinology Letters* lists 83 references. These articles assert that the first case of autism was noted in 1943, that now 1 in every 150-166 children in the US are autistic, and that 1 in every 6 US children have a learning disability. These statistics are enough to financially break every public school system in the us as officials struggle to provide these children with an education.

I believe that a potential breakthrough in the understanding of the etiology of autism occurred in 2003. Published in the International Journal of Toxicology (7), researchers noted that hair analysis of autistic children showed a very significant reduction of mercury as compared to the hair analysis of normal children. The authors suggested that this could mean that normal children are efficient at
removing mercury through mechanisms that include hair growth; in contrast, autistic children have a reduced ability to remove mercury from their bodies, increasing neurological damage.

The following year, 2004, researchers from the Department of Genetics at Arkansas Children's Hospital in Little Rock (8) noted that autistic children have reduced levels of the detoxifying antioxidant glutathione as compared to normal control children. The work of the lead researcher, S. Jill James was reviewed in Science News, April 16, 2005, noting the following (9):

Science news

April 16, 2005

Biochemistry
Blood Hints at Autism's Source

Researchers have identified a biochemical peculiarity in the blood of autistic children.

"The incidence of autism has gone up dramatically in the last 15 years," notes S. Jill James, director of biochemical genetics at Arkansas Children's Hospital in Little Rock. "Because gene don't change that fast, this points to something in the environment as a trigger," she says.

James found an unusual biochemical fingerprint in the blood of 100% of 75 autistic kids, while none of 75 normal kids had the biochemical marker.

"The autistic youngsters had unusually low concentrations of the antioxidant glutathione in their cells."

"This pattern is consistent with an inability to detoxify poisons, especially heavy metals, such as mercury or lead," James says. "That's because the antioxidant normally binds to heavy metals, and

the body then targets the molecular complex for elimination."

James suspects that autism develops under the combined effect of genetic mutations that deplete glutathione and exposure of a child to heavy metals or other poisons.

"One of the most controversial theories about autism is that vaccines preserved with the mercury-containing chemical thimerosal can cause the condition."

"Dietary treatments could boost glutathione in children carrying the genes that reduce the antioxidant," says James.

These two findings, (reduced hair mercury and reduced glutathione) appeared to be coupled; reduced levels of glutathione would reduce the ability to target and remove mercury (and other toxins) through hair growth and increase the incidence of neurological damage and autism.

Glutathione is a peptide containing the amino acids:

GLUTAMATE-CYSTEINE-GLYCINE

Three amino acids connected together means that glutathione is a peptide (small protein), which means it is coded for by a gene in our DNA. According to the work by Dr. James above, the expression of the gene that produces the peptide glutathione is a biological variable, different in everyone. Reduced expression of the glutathione gene becomes biologically important in an environment that is increasingly toxic because those so afflicted cannot properly detoxify metals (like mercury) and other toxins. The results are low hair mercury levels and increased neurological damage, including autism.

The biochemical importance of glutathione is reviewed in the 2002 book by Jimmy Gutman, MD (10) titled, Glutathione, Your Body's Most Powerful Protector. Dr. Gutman points out that glutathione is not only our body's most powerful detoxifier of mercury and other toxins (including drugs like Tylenol/ acetaminophen), but it is also the most important molecule in our anti-oxidant network that protects us from the dangers of free radicals.

Two studies published in 2005 (3, 6) and one study in 2006 (4) support the vaccine-mercury-autism-glutathione model. The 2005 article published in the journal *Medical Science Monitor* (A two-phased population epidemiological study of the safety of thimerosal-containing vaccines: a follow-up analysis) makes the following points:

1) Thimerosal is a mercury-containing preservative in vaccines.

2) Vaccinated children received doses of mercury from thimerosal-containing vaccines that are in excess of government safety guidelines.

3) Exposure to mercury from thimerosal containing vaccines is a consistent significant risk factor for the development of neurodevelopmental disorders.

4) "The United States is in the midst of an epidemic of neurodevelopmental disorders. "

5) 1 in 166 US children have an autistic disorder.

6) 1 in 6 US children have a developmental and/or behavior disorder.

7) Autism, once rare, is now more prevalent than childhood cancer, diabetes and Down Syndrome.

8) Thimerosal is recognized as a developmental toxin that can cause birth defects, low birth weight, biological dysfunctions, and psychological or behavior deficits that manifest as the child grows.

9) Thimerosal is still routinely added to several vaccines given to US children and pregnant women, including influenza, Tetanus-diphtheria, and meningitis.

10) As the Centers for Disease Control and Prevention (CDC) have expanded childhood immunizations, there has been an increase in neurodevelopmental disorders in the United States.

11) If US infants received all of the recommended thimerosal-containing *vaccines,* they could have been exposed to **200 micrograms (ug) of mercury by 18 months of age,** and even more if they also received flu vaccinations.

12) There is a linear correlation between the amount of mercury children receive from thimerosal-containing vaccines and the prevalence of autism.

13) Vaccines also contain formaldehyde, aluminum, and gelatin [a source of glutamate] .

14) This study showed a significant association between thimerosal-containing DTP vaccines and neurodevelopmental disorders, including

- 80% increased risk for autism
- 160% increased risk for speech disorders
- 220% increased risk for mental retardation
- 130% increased risk for personality disorders
- 370% increased risk for thinking abnormalities.

15) Other sources of mercury include anti-Rho immune globulin, seafood, manufacturing plant emissions, dental amalgams, and other pharmaceuticals.

16) This study shows "strong evidence of a relationship between the administration of thimerosal-containing childhood vaccines in the United States and neurodevelopmental disorders."

17) The studies that claim thimerosal-containing vaccines are safe are bogus because they are done in Europe where the vaccinations contain only 1/3rd of the mercury used in US vaccinations, and they are administered over a longer period of time. Therefore, these studies are not comparable to what is being done in the US.

18) The hair of autistic babies is very low in mercury because these babies have very low levels of the antioxidant/detoxifier glutathione. Glutathione is crucial for mercury excretion, as it attaches to toxic metals so that it can be eliminated through a number of mechanisms, including through hair growth.

19) The neurotoxicity of thimerosal is associated with glutathione depletion.

20) Studies alleging that mercury in vaccines is safe are mistaken.

21) Thimerosal should be removed from all vaccines.

The 2005 article (6) published in the journal *Neuroendocrinology Letters* (Mercury and autism: accelerating evidence?) makes the following points:

1) Genetic and environmental risk factors seem to be involved in the development of autism and neurodevelopmental disorders.

2) The increase in autism in the last decades parallels cumulative mercury exposure.

3) Autistic children have higher mercury exposure during pregnancy due to maternal dental amalgam and thimerosal-containing immunoglobulin shots.

4) Children with autism have a decreased detoxification capacity due to reduced genetic production of glutathione.

5) Glutathione is both an important anti-oxidative and detoxifying agent.

6) Autistic children have significantly decreased levels of glutathione.

7) "Promising treatments of autism involve detoxification of mercury, and supplementation of deficient [glutathione] metabolites".

The 2006 article (4) published in the *Journal of American Physicians and Surgeons* (Early Downward Trends in Neurodevelopmental Disorders Following Removal of Thimerosal-Containing Vaccines) makes the following points:

1) "In 2004, the Department of Health and Human Services and the American Academy of Pediatrics issued an Autism A.L.A.R.M., stating that:

   a. 1 in 166 children currently have an autistic disorder, and

   b. 1 in 6 children have a developmental and/or behavioral disorder." **[Incredible]**

2) The current epidemic in neurodevelopmental disorders is not due to immigration or a changed diagnostic criteria.

3) Thimerosal is a mercury-containing compound that was added to many vaccines as a preservative, it crosses the blood-brain barrier and results in appreciable mercury content in the brain.

4) Small concentrations of thimerosal can induce neuronal death, neurodegeneration, membrane damage, and DNA damage within hours of exposure.

5) The U.S. Centers for Disease Control and Prevention increased the number of thimerosal-containing vaccines to be given to US children from the early 1980s to 1999. This increased infant mercury exposure from 100/ug to 275 /ug in the first 18 months of a child's life.

6) The incidence of neurodevelopmental disorders is US children increased 2 to 8 fold during this period of time, paralleling the increase in mercury exposure from thimerosal-containing vaccines.

7) On July 7, 1999, both the American Academy of Pediatrics and the US Public Health Service recommended the removal of thimerosal from vaccines.

8) Thimerosal was reduced in the vaccines given to US children from 1999 through 2003.

9) This reduction of thimerosal-containing vaccines given to US children resulted in a significant 35% decrease in Autism and neurodevelopmental disorders in US children.

10) Neurodevelopmental disorder rates correspond directly to the cumulative mercury dose to which children were exposed from thimerosal-containing vaccines through the US immunization schedule.

11) "An infant who received all of these vaccines on schedule could have received as much as 200 micrograms (ug) of mercury during the first 6 months of life."

12) Today, thimerosal is still routinely added to some formulations of influenza vaccine and to the tetanus-diphtheria and monovalent tetanus vaccines.

13) "Examinations of the Vaccine Adverse Event Reporting System, the U.S. Department of Education, and the Vaccine Safety Datalink databases show significant links between exposure to thimerosal-containing vaccines and neurodevelopmental disorders."

14) Breast-fed babies who received all recommended vaccines exceeded the mercury safety guidelines established by the US Environmental Protection Agency, Health Canada, the World Health Organization, the Agency for Toxic Substances Disease Registry, and the US Food and Drug Administration (FDA).

15) This study shows that "very specific neurodevelopmental disorders are associated with thimerosal-containing vaccines."

16) Autistic children have a significant decrease in the plasma concentration of glutathione.

17) Autistic children have significantly increased oxidative stress in comparison to control children. This is relevant because glutathione is our body's most powerful antioxidant that reduces oxidative stress.

18) Glutathione is a necessary metabolite for the excretion of mercury from the body.

19) This means that low levels of glutathione in Autistic children will give their bodies a larger mercury burden, increasing neurodevelopmental disorders and oxidative stress.

Two of the articles (6, 9) reviewed here suggest there is a potential for the prevention and treatment of glutathione deficient autistic and neurodevelopmental disorder children by using dietary strategies. Oral supplementation with the glutathione peptide does not elevate the body's glutathione levels and is therefore an inadequate strategy. Approaches that do elevate glutathione levels include:

Again, glutathione is a peptide consisting of the amino acids

Glutamate-- -Cysteine---G lycine

The rate-limiting factor in glutathione production is the amino acid cysteine. Oral supplementation with a specific form of cysteine will definitely elevate the body's levels of glutathione, and has proven detoxification and anti-oxidant benefits. The specific form of cysteine that elevates glutathione levels is **N-Acetyl Cysteine, or NAC.**

2) A second approach to elevate the levels of glutathione involves supplementation with vitamins B6, B12, and folic acid. These vitamins accelerate the conversion of the non-protein amino acid homocysteine to cysteine.Recall that elevated homocysteine is a significant biological marker for cardiovascular risk (11), and the cardiovascular risk is reduced with vitamin B6, B12, and folic acid supplementation. In fact, elevated levels of homocysteine is potentially the best biological marker for vascular event risk as a consequence of chiropractic adjusting (12). Consequently, taking these B vitamins not only elevates levels of the detoxifying anti-oxidant glutathione, they do so by reducing levels of homocysteine, an amino acid that makes our vascular system frail.

Homocysteine → Cysteine
B6, B12, Folic Acid

3) Supplement with 10 - 30 grams per day of undenatured whey protein. According to Dr. Gutman (10), consuming undenatured whey protein is the single best way to elevate glutathione levels. Dr. Gutman stresses that the whey protein must be "undenatured" which is a special process that protects the fragility of the molecules. Only undenatured whey elevates glutathione levels. The product must also be protected by not heating it or agitating it with a blender, or it will not elevate glutathione levels.

For my N-acetyl cysteine (NAC) I use Complete Glutathione from Nutri-West.

For my B6, B12, and folic acid I use Complete Omega-3 Co-Factors from Nutri-West.

For my undenatured whey protein I use Complete Whey-G from Nutri-West.

Nutri-West is a nutrition company owned by a chiropractic family from Douglas, Wyoming. Their products are exceptional and always coupled with synergistic ingredients; I can freely speak to their primary nutritional biochemist at anytime. Nutri-West is a strong supporter of chiropractors and chiropractic.

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