

Chelation: Removal of Toxic Metals

Rationale: Many children with autism have a low amount of active glutathione, and a higher fraction of their glutathione is oxidized (inactive). Glutathione is the body's primary defense against mercury, toxic metals, and many toxic chemicals, so a low level of glutathione results in a higher body burden of toxins. Also, many children with autism had increased use of oral antibiotics in infancy, which alter gut flora and thereby almost completely stop the body's ability to excrete mercury. Normalizing glutathione, restoring gut flora, and removing toxic metals often results in reduction of the symptoms of autism.

Preparation for Treatment: Prior to beginning chelation, it is important to first prepare the body for it. This includes:

- 1) Reducing exposure to toxins (organic food, reverse osmosis water, no mercury fillings, avoiding pesticides, etc.).
- 2) Improving levels of essential vitamins and minerals – see section on vitamins and minerals.
- 3) Improving glutathione levels - see section on glutathione.
- 4) Treating gut dysbiosis – see sections on gut treatments.

Testing:

There are several good ways to test for heavy metal toxicity. They include:

- 1) **Urinary porphyrins:** This test checks for abnormal levels of porphyrins in the urine, where different porphyrin levels appear to correlate with body burden of mercury, lead, or other toxic metals. See <http://www.labbio.net>
- 2) **Challenge dose:** Give a trial of DMSA or DMPS, and measure the level of toxic metals in the urine before and after taking it. A large increase indicates that the metals are present, and that the medication is helpful in removing them.

Hair, blood, and unprovoked urine testing only indicate recent exposure to toxic metals, and are NOT useful in determining past exposure. Children may have a high body burden but a low level in their current hair, blood, or urine.

Treatment: The chelation treatments recommended by DAN! include DMSA, DMPS, and TTFD.

DMSA: Oral DMSA is approved by the FDA for treating lead poisoning in children. Some of the compounded rectal suppositories also appear to increase excretion of toxic metals, but the transdermal forms do not measurably increase excretion of toxic metals.

Safety: DMSA only slightly affects excretion of most essential minerals, so a basic mineral supplement can compensate for this. The exception is that the first dose of DMSA removes a significant amount of potassium (equivalent to that in a banana), and that is not included in mineral supplements, so 1-2 servings of fresh fruit or vegetables should be consumed to restore potassium levels. DMSA also significantly increases excretion of cysteine, so that should be supplemented before and/or during therapy.

DMSA has a small chance of increasing liver enzymes or decreasing blood cell count, so those should be monitored during treatment.

DMPS: DMPS is not approved by the FDA, but a physician may have it legally compounded for IV, oral, and rectal use, all of which increase excretion of toxic metals. The transdermal form does NOT appear to increase excretion of toxic metals.

Safety: DMPS slightly increases the excretion of some essential minerals, so a basic mineral supplement is recommended to compensate for this loss. It is unknown if it causes a loss of potassium.

DMPS has a small chance of increasing liver enzymes or decreasing blood cell count, so those should be monitored during treatment.

TTFD: A small pilot study of TTFD (used as a rectal suppository) resulted in some increase in excretion of arsenic and possibly other metals, and also significant reduction of autistic symptoms. The transdermal form may also work, although more study is needed.

Safety: TTFD appears to be exceptionally safe, with animal studies at high doses finding no evidence of toxicity.

More info: Anyone considering chelation therapy is urged to read the DAN! Consensus Report on Treating Mercury Toxicity in Children with Autism, available at www.autismresearchinstitute.com. This report provides much more detailed advice on pre-treatments, treatments, dosages, and safety.

Research:

There is substantial evidence to suggest that many children with autism suffer from exposure to mercury, and probably other toxic metals and toxic chemicals. The data includes:

- 1) A literature review by Bernard et al showing that the symptoms of autism were very similar to those of people suffering from infantile exposure to mercury poisoning.

Bernard S, Enayati A, Redwood L, Roger H, Binstock T. Autism: a novel form of mercury poisoning. *Med Hypotheses*. 2001 Apr; 56(4):462-71. Review.

- 2) A study by James et al. found that children with autism had low levels of glutathione, which is the body's primary defense against mercury.

James et al, Metabolic endophenotype and related genotypes are associated with oxidative stress in children with autism. *Am J Med Genet B Neuropsychiatr Genet*. 2006 Dec 5; 141(8):947-56.

- 3) A large study by Nataf et al. found that over half of children with autism had abnormal levels of a porphyrin in their urine that highly correlates with a high body burden of mercury.

Nataf R, Skorupka C, Amet L, Lam A, Springbett A, Lathe R. Porphyrinuria in childhood autistic disorder: implications for environmental toxicity. *Toxicol Appl Pharmacol*. 2006 Jul 15; 214(2):99-108

- 4) A study by Bradstreet et al. found that children with autism excreted 3-6x as much mercury as did typical children when both were given DMSA.

Bradstreet J., Geier DA, Kartzinell JJ, Adams JB, Geier MR, A Case-Control Study of Mercury Burden in Children with Autistic Spectrum Disorders, *J. Am. Phys. Surg* 8(3) 2003 76-79.

- 5) A baby hair study by Holmes et al. found that children with autism had unusually low levels of mercury in their baby hair (1/8 normal), suggesting a decreased ability to excrete mercury. A replication study by Adams et al. found similar, although less dramatic, differences. The Adams et al study also found that children with autism had much higher usage of oral antibiotics than did typical children, which is important because usage of oral antibiotics almost completely stops the body's ability to excrete mercury.

Holmes AS, Blaxill MF, Haley BE. Reduced levels of mercury in first baby haircuts of autistic children. *Int J Toxicol*. 2003 Jul-Aug; 22(4):277-85.

- 6) A small pilot study by Adams et al found that children with autism had 2x more mercury in their baby teeth than did typical children, suggesting that they had a higher body burden of mercury during their infancy when the teeth formed. That study also found that

children with autism had a much higher usage of oral antibiotics during their infancy, similar to their baby hair study.

- 7) Two studies of airborne mercury, in Texas and in the San Francisco Bay area, found that the amount of mercury in the air correlated with the incidence of mercury.

Windham et al, Autism spectrum disorders in relation to distribution of hazardous air pollutants in the San Francisco bay area. Environ Health Perspect. 2006 Sep; 114(9):1438-44. Palmer RF, Blanchard S, Stein Z, Mandell D, Miller C. Environmental mercury release, special education rates, and autism disorder: an ecological study of Texas. Health Place. 2006 Jun; 12(2):203-9.

- 8) There have been nine epidemiological studies of the link between thimerosal in vaccines and autism. Four published studies by the Geiers have consistently found that children who received thimerosal in their vaccines had a 2-6x higher chance of developing autism than those who received thimerosal-free vaccines. Four published studies by groups affiliated with vaccine manufacturers have failed to find a link, and one was inconclusive. Three of the studies were conducted in other countries where the usage of thimerosal is much less and the incidence of autism is much lower, so those results have limited relevance to the US.