

The Effects of Environmental Toxicity on Neurological Development and Non-Invasive Laboratory Testing for the Autistic Child

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Who I am

- My name is Mark Schauss and I am the President of Carbon Based Corporation and the developer of a laboratory interpretive report called CellMate™.
- I have spent the past 20 years reviewing and helping to interpret over 25,000 laboratory tests.
- My company has worked with close to 1,000 health care practitioners in the past 10 years
- I am also the father of two children one of whom has epilepsy.





Who I am

- My focus to find answers to my daughter Tasya's seizure disorder has led me to investigate environmental issues that may have caused or at least triggered her development of epilepsy.
- Because of this search I have uncovered a number of bits of information that also have major implications in Autism and ADHD.



Topics of discussion

- The effects of environmental pollutants other than mercury and their effects on neurodevelopment of children and its implications in the increase of Autism and ADHD.
- Sources of these pollutants.
- Laboratory testing, using non-invasive methods and the correct interpretation of the results.
- Development of nutritionally based protocols for the safe and efficacious detoxification of the aforementioned neurotoxins.





Toxins in the Environment

- The main core of toxins I will be discussing today will focus on those of a petrochemical source.
- These include:
 - **Phthalates**
 - Benzene
 - Styrene
 - Xylene/Toluene
 - Organochlorines/Organophosphates
 - **Bisphenol A (BPA)**
 - **Perchlorates**



Toxins in the Environment

- To explain the effects of toxins like the ones on the previous slide comprehensively would honestly take a couple of days.
- I will attempt to give you the most important information that you can take home with you and help lower the toxic levels your child faces each day.
- I will also leave you with a number of resources that will allow you to investigate this issue more completely.





Toxins in the Environment

- But isn't mercury the main issue?
- While mercury is a lynch pin toxin when it comes to neurodevelopment and autism it isn't the only issue that is affecting our children.
- Some of the toxins I will be discussing can have profound affects on neurological functioning as well as other health related issues faced by the autism community.



Mercury – Couple of Tidbits

- In the August 2001 issue of **Atmospheric Environment**, researchers reported that levels of dimethyl mercury from landfills "is higher, by a factor of 30 or 40, than concentrations of total mercury in the ambient air. They also reported that the dimethyl mercury concentration was 1,000 times greater than any measurement ever!!!"
- Concentrations of methylmercury - the element's organic and most poisonous form - exceeded 25 nanograms per liter of Great Salt Lake water. Fish consumption warnings in the Florida Everglades were posted when water there was found to have 1 nanogram per liter





Toxins in the Environment

- According to the United States Environmental Protection Agency in 2002 through their “Toxic Release Inventory” tracking system, over 7.1 billion pounds of 650 different industrial chemicals were released in the air and water, 266 of which are linked to birth defects.
- A neurotoxin known as diazinon, a commonly used insecticide, was found in nearly 1/3 of drinking water during a national water sampling program.



Phthalates

- Phthalates are one of the most commonly used chemicals today.
- They are found in many cosmetics, shampoos, conditioners, perfumes, deodorants, nail polish, scented candles, air fresheners and can be ingested if a child sucks on or bites down on a plastic. It is used in the manufacture of plastic bottles and is a component of PVC piping.
- Phthalates can be absorbed through the skin, inhaled as fumes, ingested when they contaminate food and are inadvertently but directly administered to patients from some PVC (polyvinyl chloride or vinyl) medical devices.





Phthalates

- Hundreds of animal studies have shown that phthalates can damage the liver, the kidneys, the lungs and the reproductive system, especially the developing testes.
- 5% of the 20 to 40 year old women tested by the Centers for Disease Control and Prevention (CDC), are getting up to 45 times more phthalates than previous daily intake estimates and they are at levels of concern. While the CDC found evidence of phthalates in virtually every one of the cross-section of Americans tested, evidence of the highest levels of exposure to the phthalate DBP (dibutyl phthalate) were found in women of childbearing age.



Phthalates – Health Implications

- A study has implicated phthalate exposure to DNA damage to male sperm
 - The Relationship between Environmental Exposures to Phthalates and DNA Damage in Human Sperm Using the Neutral Comet Assay Susan M. et al Environmental Health Perspectives July 2003.
- They will also change the anogenital distance in developing male fetuses. The higher the level of phthalates the greater the damage.
 - Male Rats Exposed to Linuron in Utero Exhibit Permanent Changes in Anogenital Distance, Nipple Retention, and Epididymal Malformations That Result in Subsequent Testicular Atrophy. McIntyre BS, Barlow NJ and Foster PMD, Reproductive and Developmental Toxicology 2002.





Phthalates – Health Implications

- Phthalate exposure has been correlated to the shortening duration of pregnancy
 - Exposure to phthalates commonplace in pregnant women may shorten duration of pregnancy by one week. Latini G. et al – Environmental Health Perspectives November 2003.
- Environmental chemicals are being strongly implicated in fetal development and reproductive health.
 - How strong is the evidence of a link between environmental chemicals and adverse effects on human reproductive health? Sharpe RD and Irvine DS, British Medical Journal, February 21, 2004.



Phthalate – Health Implications

- March 2004 issue of EHP – According to the CDC, 97% of 2,540 individuals tested had been exposed to one or more phthalates.
- While the industry maintains that the levels found in humans and animals are low, it is important to note that it is *chronic, long-term exposure* that should be of great concern.
- A disturbing body of evidence is coming to light that it is the male developing fetus that shows the most effect from phthalate exposure.



Phthalates – Health Implications

- Phthalates increase the formation of quinolinic acid.
- Quinolinic acid can induce hippocampal and neuronal damage.
- Autistic children typically have elevated quinolinic acid



Phthalates - Finding the Sources

- Di-ethyl phthalate: **Toothbrushes**, auto parts, tools, toys, **food packaging**, insecticides, mosquito repellents, **aspirin** and volatile components of cosmetics -- perfumes, nail polishes and hair sprays.
- Di-n-butyl phthalate: Cellulose plastics, solvents for dyes, solvents for cosmetics (i.e., nail polish), **food wrap**, perfumes, skin emollients, hair spray, **insect repellents**.
- Benzyl butyl phthalate: Plasticizers in adhesives, PVC flooring, wood finishes, biodegradable tampon ejectors.





Phthalates – Finding the Sources

- It is in our waters, air, and food. It is pretty much everywhere and its not going away soon.
- Two other sources:
 - Time released medications use the plasticizer.
 - New Car Smell
- One HUGE tip to take away today. **Never**, ever microwave anything in plastic!!! You will release levels of phthalates and (often times) styrene that are way above even the governments high acceptable levels.



Why should I be concerned???

- The phthalates I just discussed and some of the chemicals I will talk about are known as “Endocrine-Disruptor Chemicals” (EDC’s).
- These effect the following glands: thyroid, pituitary, adrenals, parathyroids, pancreas, ovaries and testes.
- This in turn will effect rates of metabolism, growth and development, sexual characteristics, development of personality, higher nervous function, ability to deal with stress and resistance to disease.





Why should I be concerned???

- Our brains operate using highly intricate chemical communication systems.
- For chemical communication to occur properly, a receptor must have an affinity for specific chemical ligands or signals. These then initiate a response. These endocrine-disruptors threaten the integrity of chemical communication systems.
- It is my belief and the belief of a growing number of scientists that these chemical are effecting the normal development of our children at a degree far greater than ever imagined.



Bisphenol A

- BPA is molecule invented in the 1930s as a synthetic *estrogen*. Chemists subsequently learned that BPA could be combined in molecular chains to make polycarbonate plastic like Nalgene and other materials like the lining of cans of food.
- Out of 115 studies conducted over the past 7 years 94 found health effects from BPA. Not surprisingly, 11 out of 11 industry funded studies showed no effect at all.

	Adverse effect	
	effect	No effect
Industry funded	0	11
Government funded	94	10





Bisphenol A – Health Implications

- Many of the effects are similar to those of phthalates but one has ramifications with autism.
- BPA increases oxidative stress which is well documented in autistic children.¹
- It causes changes in brain development and function.²

1 - Chitra KC, C Latchoumycandane, and PP Mathur. 2003. Induction of oxidative stress by bisphenol A in the epididymal sperm of rats. *Toxicology* 188:119-127.

2 - Ramos JG, J Varayoud, L Kass, H Rodriguez, L Costabel, M Munoz-De-Toro, EH Luque. 2003. Bisphenol a induces both transient and permanent histofunctional alterations of the hypothalamic-pituitary-gonadal axis in prenatally exposed male rats. *Endocrinology* 144:3206-3215.



The Industry Argument

- There are no studies showing a difference between exposed groups and control groups.
- A recent survey by the Center's for Disease Control (CDC) has established that virtually all Americans are exposed to BPA within the range of exposures that the vom Saal and Hughes summary indicates is relevant. This further complicates epidemiological studies because, with everyone exposed, ***there can be no clean controls against which to compare cases***





Perchlorates

- These additives to rocket fuel are at the center of a growing controversy in the United States.
- Most research into perchlorates has been done to determine their LD50 level, the level at which 50% of the tested animals die.
- According to the paper Body Burden by the Environmental Working Group (www.ewg.org) “A growing body of literature links low dose chemical exposures in animal studies to a broad range of health effects previously unexplored in high dose studies.”



Perchlorates

- With some chemicals, an effect seen at a high dose is not seen at a low dose and visa versus.
- Perchlorate, a rocket fuel component, causes changes in the brain at .01 – 1 mg/kg per day but not at 30 mg/kg per day according to Argus 1998 and others.
- We see with perchlorates that an effect seen at a low dose does not appear at a higher dose. This effect is known as a biphasic dose response.





Perchlorates

- From the 2004 Environmental Health Perspectives journal "...there is broad agreement that perchlorate interferes with the uptake of iodine into the thyroid gland as well as other tissues, including the placenta and mammary gland." "Whereas adults have the reserve capacity to withstand a month or more with limited iodine intake, a fetus or infant can be harmed much more rapidly due to the reliance of the developing brain on adequate thyroid hormone levels."



Additive Effects of Toxicity

- The effect of multiple toxins is one of the least studied and least understood mechanism of biochemistry today.
- There is a growing body of evidence that the effect of toxins is not additive but multiplicative or logarithmic in nature.
- An example is arsenic. Its toxicity can increase 100 fold in the presence of alcohol.






Other Toxic Issues

- According to an article in the recent **Environmental Health Perspectives**, differences in temperature, humidity and atmospheric pressure affect the level at which toxic effects are seen.
- The difference can be up to 15 fold!
- Heat and humidity can greatly increase toxic effects.



Are we scared enough???





Know your enemy, Know your friends

- When dealing with environmental toxins, it is important, no **CRITICAL**, to know what you are dealing with.
- There is truly only one way to determine what your enemy/toxin is and that is through the use of laboratory testing.
- Because of new techniques and the work of dedicated scientists, many of the tests that are available are non-invasive, do not need blood draws.



Heavy metal testing

- As many of you know the most common test to assess the levels of heavy metals, especially mercury, is a hair elements test.
- This easy test requires hair from the nape of the neck and a lab qualified to do the test.
- Doctor's Data based here in the Chicago area is one of the best labs in the country in the field of heavy metal testing.





Heavy Metal Testing

- The important thing is to get a proper interpretation of the test. A good resource is the book - Hair Test Interpretation: Finding Hidden Toxicities by Dr. Andrew Cutler www.noamalgam.com
- Carbon Based Corporation also has an interpretive report based on the results of the hair elements test from Doctor's Data.



Environmental Pollutants Test

- Last August, I was approached by a lab in Seattle, Washington about a test they were developing to assess solvents in urine.
- They wondered whether a simple and inexpensive first morning urine test to look into these toxins would be of value.
- Since previous methods of assessment included fat biopsy or blood tests, both invasive and expensive, I jumped at the chance to work with it.





Environmental Pollutants Panel

- **Xylene** – Measured by looking at 2- and 3-methylhippurate excretion
- Xylene may cause problems with the central nervous system. Other symptoms are arrhythmia, dermatitis, conjunctivitis, renal damage, and paresthesias of the extremities. Xylene has also been suggested as causing mild hematopoietic system toxicity in experimental animals. Toluic acid is converted to methylhippuric acid through conjugation with glycine and excreted in the urine.



A word of caution....

- There are a number of detoxification programs and boxes out there that claim to be effective means of removing toxins from the body.
- Some are effective, but some are dangerous, especially with ASD children.
- A few we've seen will upregulate phase I detox which can cause the creation of metabolites that are more toxic than had you left it alone.
- Many autistic children already have upregulated phase I detox capabilities.





A word of caution....

- This increased phase I detox may be why autistic children may be more susceptible to some toxins like phthalates, bisphenol A and perchlorates.
- Anti-fungals and antibiotics tend to down regulate phase I so the effect they have on ASD children may be related to the slowing down of this reaction and not to the control of yeast or other bacterial infections.



Environmental Pollutants Panel

- Xylene, toluene, phthalates and styrene can be detoxified using glycine, a broad spectrum amino acid complex, balanced electrolytes, fatty acids and improving glutathione production. There are differences between the methods to detox each of the aforementioned solvents. This is detailed in the interpretive reports from US Biotek and Carbon Based.
- Sauna's are another way to help excrete these toxins.





Environmental Pollutants Panel

- Benzene on the other hand needs to be carefully detoxified because an incorrect protocol can be harmful.
- Benzene's toxicity can be accentuated by both phenol and hydroquinones so avoidance of these in the diet is critical. These include alcohol, coffee, and black tea. Cigarette smoke is a common source of both benzene and phenol compounds which is what makes it so carcinogenic.
- Another important issue to address is gut health when dealing with elevated benzene markers as some pathogenic gut bacteria can biotransform certain amino acids (tyrosine) into phenol compounds.



Resources

- Environmental Working Group – Filled with usable information on the presence of toxins in the environment.
 - www.ewg.org
- Our Stolen Future – Based on the book of the same name by Theo Colborn, Diane Dumanoski and John Peterson Myers, this is another excellent resource on toxins.
 - www.ourstolenfuture.org





Resources

- The journal Environmental Health Perspectives offers free online access to all of their articles. One of the richest sources of information on the subject.
 - www.ehponline.org
- Not too pretty is another great website on the problems of cosmetics.
 - www.nottoopretty.org
- Another great website on toxins.
 - www.chemicalbodyburden.org



Resources

- **Books**
 - Detoxify or Die – Dr. Sherry A. Rogers
 - Our Stolen Future – Colborn, Dumanoski and Myers
 - Oxygen: The molecule that made the world – Nick Lane
 - The Healing Nutrients Within – Dr. Eric Braverman
 - Hair Test Interpretation: Finding Hidden Toxicities – Dr. Andrew Hall Cutler



Resources

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