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Discussion Title: What Do Toxins Have To Do With Autism?

1. There has been much discussion about various treatment approaches and what are perceived as possible causes for autism and its many related disorders. At CARE Clinics, we approach the autistic patient by performing multiple tests to identify the toxic burden, their nutritional status, their capacity for handling toxicity, their genetic predisposition(s), and their baseline status. We believe that toxic burden and the individual's ability to handle toxins play a major role in the etiology of autism spectrum disorders.
2. The term, "toxin" refers to a host of agents, from heavy metals and organic pollutants to infectious agents, electrical pollutants and ionizing radiation.
3. The term, "detoxification" refers to the direct removal of toxins, or inactivation of a toxin's detrimental effect.
4. Worldwide, we are inundated with an incredible number of toxic substances. In the U.S. there are over 80,000 recorded chemicals in use, with 4 billion pounds of chemicals released into the environment, including 72 million pounds of known carcinogens. Sadly, we know very little about the effects of these substances on a developing brain. Only 12 chemicals have been tested for neurotoxicity, including mercury, lead, PCBs, alcohol, nicotine and a few pesticides.
5. These toxic chemicals are accumulating in all sectors of our environment and are found at increasing levels in our population. This trend is inciting a host of diseases and symptoms, but the underlying cause is largely going unnoticed. With greater the amounts of toxins in our environment, we will continue to accumulate more of these toxins in our bodies.
6. Mothers do not merely pass on their genes, but during pregnancy they also pass on toxins that are in their bodies. These toxins can have a devastating effect on the developing fetus.
7. For example, pesticides are found in high amounts in nearly all homes. The vast majority of these agents act by poisoning the nervous system of the pest they are designed to kill. 140 are known neurotoxins with a third of them being used in the food we eat.

8. In a study performed in the Philippines on the first stool of 486 newborn infants, 100% of them had some hazardous chemical found in their stool, clearly reflecting that their mother's had transferred these toxins to their child. When we start off with toxins from birth, and begin to accumulate toxins immediately after birth, we can expect disease to manifest if protective and detoxification mechanisms are impaired.
9. We do not fully understand the effects of low-level energy radiation on the human body. Also, the effects of combined toxic exposures are unclear. We think of toxins as causing a set of problems when the level reaches some critical point, but fail to understand that other factors play a role in modifying the effect. There is good evidence that multiple, low-level exposures combine to induce a more significant reaction. How the combination of toxins act in tandem to induce disease is unknown.
10. Children are much more sensitive to toxicity reactions. Because they have smaller bodies, increased absorption capacity and dynamic growth, they are more susceptible to toxic interference.
11. At CARE Clinics, we encourage parents to undergo testing. We find that parents are commonly toxic, and their children are exposed to these toxins in utero. In some cases, the mother is more toxic than the child. These findings suggest that the age of exposure, nutritional status, and genotypic predispositions, significantly increase the negative effects of these exposures.
12. A child with autism who is exposed to mercury in utero is commonly unable to excrete mercury – even when intravenous chelation is administered – until nutritional deficiencies are corrected.
13. Although many toxins may be incorporated into an individual, these toxins may not become manifest symptoms or disease until a critical threshold is exceeded. An individual's threshold is determined by several factors, including genetic predispositions and nutritional sufficiency, which are identified as biomarkers of susceptibility.
14. Our bodies handle all toxins through a two step process, called phase I and phase II detoxification. Phase I involves the biotransformation of toxic agents using the cytochrome, mixed-function enzyme system, and converts toxins via oxidation, reduction and hydrolysis. The objective of phase I is to make toxins more water soluble for elimination, or to prepare it for further processing in phase II.
15. Phase II involves peptide conjugation, which is heavily dependent upon amino acids derived from dietary proteins. Genetic defects in the production or utilization of these peptides, such as impaired sulfation or glutathione conjugation, can impair phase II detoxification. Digestive enzyme deficiencies and/or low stomach acid can impair protein digestion, and contribute to amino acid deficiency. Any stress, including toxic and emotional stressors, can result in impaired enzyme production, leading to

amino acid deficiency and impaired phase II; this results in the individual having a blocked phase II and impaired elimination of toxins.

Also, undigested proteins can induce growth of abnormal intestinal bacteria and yeast, resulting in an increased production of microbial derived toxins. These toxins can irritate or paralyze the gut and produce a host of foul aromatic compounds that are frequently described by parents of autistic children. These toxins also may induce inflammation and swelling of the intestinal wall, leading to an impaired gut barrier and subsequent absorption of undigested proteins which commonly provoke food allergies and other various allergic reactions.

Immune cells in the intestinal track are designed to protect against any invading organism. However, the presence of foreign proteins and other toxins can overwhelm the immune system's ability to respond effectively, increasing susceptibility to infection and autoimmunity.

The inflammatory response can often be treated effectively with safe, natural agents like essential fatty acid supplementation. But all too often children receive steroidal anti-inflammatory and antibiotic medication, which further impair the immune system and create additional opportunities for abnormal microbial growth.

Amino acids are also needed for neurotransmitter production. Reduced availability of these agents results in brain dysfunction or impaired brain development.

16. Effective phase I and II processing is needed for adequate removal of the many toxins we are exposed to in our environment. Adequate oxygen, exercise and dietary nutrition generally results in normal functioning of phase I and II. Moderate exercise can be used to enhance insufficient phase I and II detoxification pathways. All too often we fail to incorporate an exercise program into our treatment regimen.
17. Problems arise when an individual has blocked detoxification pathways. Unfortunately, toxins themselves can block these pathways. This interference also occurs frequently during normal physiologic processes, such as the stress response, which can impair digestive function. Treatments to enhance Phase I include oxidative therapies, like hyperbaric oxygen therapy (HBOT), and hot or infrared saunas. These modalities particularly mobilize organic pollutants, which increases the requirement for nutrient co-factors and phase II activity. Phase I should not be enhanced until other related detoxification pathways (especially phase II) have been corrected. Promoting phase I without adequate phase II activity will dramatically increase toxic reactions and oxidative stress.

18. Impaired phase II can result in the accumulation of oxidative intermediates that may be more damaging than the original toxin. This type of response can result from pushing phase I modalities when phase II is blocked. As stated previously, phase II is heavily dependent on having good bowel and digestive function to support elimination. Without good bowel and digestive function, pushing phase II, like with any type of chelation therapy, can result in adverse reactions. Therapies for improving bile flow and bowel function should be used prior to pushing phase II modalities. Supporting regular bowel movements and using non-absorbable agents that bind toxins in the gastrointestinal track prior to a phase two treatments can help prevent toxic reactions.
19. Toxic exposure initiates a stress reaction, which in turn impairs digestion and adsorption, the immune response, and the neurotransmitters that are crucial for normal brain function. Toxins can also directly impair enzyme and hormone function. Toxins may deposit in various parts of the body and brain, resulting in dysfunction of the area affected.
20. The stress response occurs naturally to help an individual endure through stressful situations. However, if left uncontrolled, it can be detrimental to the individual.
21. Exposure to electric fields and ionizing radiation magnifies the effect of other toxins in the body, and vice versa. This magnifying effect is particularly true when toxins contain an electric charge, like heavy metals. Toxins are cumulative: the more toxins present in the individual, the greater the toxic effect. Electrical pollution worldwide has increased tremendously, particularly in the last ten years. Stray voltage, electric and magnetic fields, earth currents, transient and high frequency noise have all increased. For example, in the United States, electric utility providers use the earth, the actual ground that we walk on, as a receptacle for unused current. To do this, our body acts as an electric conduit, scavenging impure, unused current from the air and deposits it into the ground.
22. There is a direct relationship between the rise in electric pollution and the rise in the rate of autism. It is possible that this increase is due to the magnifying effect electric pollution has on other toxins such as heavy metals.
23. Electrostatic charges in the atmosphere can increase toxic exposure, as these attract charged particles, in particular heavy metals, into the area. Acidifying pollutants, such as sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>) and ammonia (NH<sub>3</sub>), that are especially high in industrialized areas, also attract and increase the atmospheric deposition of heavy metals such as mercury.
24. Wind patterns may play a major, yet unrecognized, role in environmental toxin distribution, as it has been shown that individual toxic exposure is greater downwind of a source.

25. In addition to mercury, we are finding much lead in our patients with autism. Increased exposure to lead has been documented, including the importation of contaminated toys and candy, from China and Mexico, respectively. In several children, we have identified lead within the red blood cell, indicating recent exposure. Upon taking a medical history, we discover that these children commonly place these types of objects into their mouths. When recent exposure is identified, we advise parents about common sources of these toxins. There are several commercial kits available for parents to check toys and other objects in the child's environment for lead contamination.
26. Lead is a ubiquitous contaminant, and is detectable in virtually every individual around the world. This is especially concerning given the fact that lead is considered one of the most toxic contaminants, and is a known neurotoxin. Studies in China have shown that for every 1% of total body lead removed from children, there is a 1 point improvement in IQ. With the same exposure, infants will absorb up to 50% more lead than adults, and they are more sensitive to its toxic effects.
27. Studies have shown that American and British persons have on average 1000 – 3000 times more lead than individuals living 1000 years ago.
28. With the availability of Thimerosal-free vaccines, mercury exposure during vaccination has declined. Since autism rates continue to rise, some researchers believe that this suggests mercury-containing vaccines were never involved in the pathogenesis of autism. However, this is faulty thinking. The vaccine picture in autism is obscured by the fact that other exposures to mercury have increased. Atmospheric and dietary mercury, to name a few, have increased, and mothers during pregnancy contain higher levels of mercury, as well.
29. Additionally, one has to take into consideration the multiplication factor that occurs from concurrent toxin exposures. Not only is mercury increasing in our environment, but lead and other toxins are as well. For example, with simultaneous, low-level exposure to several heavy metals, the toxicity of these metals may be increased 10 to 100 fold.
30. Mercury in woman of child bearing age is increasing. This is primarily due to increased consumption of contaminated food, and exposure to an increasingly toxic environment.
31. Studies show a direct correlation between environmental exposure and the incidence of children with neurobehavioral disorders.
32. Autism and toxicity related disorders share many common signs and symptoms.

33. Neurons have the greatest number of mitochondria. These mitochondria require and utilize great amounts of oxygen, and as a result, they produce high amounts of pro-oxidants. Ironically, neurons are the most cell type to oxidative damage. Therefore, it is very important to evaluate for aberrant mitochondrial function and oxidative stress. Mercury, antimony and arsenic are known to interfere with mitochondrial function, as well as nutritional deficiencies like glutathione. Mitochondrial function can often be corrected by removing heavy metals and optimizing nutritional status.
34. Children who have multiple fillings and metal caps develop similar urinary and bowel problems that we frequently see in children with autism spectrum disorders.
35. Food allergies, leaky gut and other bowel problems frequently found in autistic children are also frequent findings in mercury toxic individuals.
36. Heavy metal toxicity is a frequent finding in autoimmune disorders.
37. Heavy metal toxicity is a frequent finding in psoriatic and eczematous disorders.
38. Muscle tone, cognition and socialization – all symptoms of autism – improve with chelation and the removal of heavy metals. After detoxification and improved function, regression can easily be seen with re-exposure to toxic exposures.
39. Autism is a multi-factorial condition. However, a majority of these factors are effectively addressed by reducing toxic burden, improving detoxification capabilities, restoring gut function, addressing low-grade infections and immune dysfunction, and providing nutritional supplementation.