

Below is a list of frequently asked questions concerning environmental health and autism, and related issues:

1. [What is causing the rapidly rising rates of autism spectrum disorders \(ASD\)?](#)
2. [What are the heavy metals?](#)
3. [Is mercury exposure a contributor to ASD?](#)
4. [How do genes and environmental exposures interact in ASDs?](#)
5. [Are autism rates in other countries rising?](#)
6. [What is a toxic “body burden”?](#)
7. [What is the relationship between environmental toxins and ASD?](#)
8. [Are pesticides a potential contributor to ASD?](#)
9. [What is autoimmunity and what is its relationship to ASD?](#)
10. [How is the digestive system related to ASD?](#)
11. [What is the link between the digestive system and the brain in people with ASD?](#)
12. [How are the immune and nervous systems related to ASD?](#)
13. [What is a Toxicant-Induced Loss of Tolerance \(TILT\)?](#)
14. [Have some children with autism recovered from ASD?](#)
15. [How is the science of epidemiology helping to discover links between environmental exposures and diseases such as autism?](#)
16. [What is the Environmental Working Group?](#)
17. [What is the Toxic Substances Control Act?](#)
18. [What is the Kids Safe Chemicals Act?](#)
19. [What is the M.I.N.D. Institute?](#)
20. [What are the CHARGE and MARBLES projects?](#)
21. [What is the Autism Phenome Project?](#)
22. [What is an Environmental Medical Unit?](#)

### **What is causing the rapidly rising rates of autism spectrum disorders (ASD)?**

Research indicates that other factors besides the genetic component are contributing to the rise in increasing occurrences of ASD, such as environmental toxins (e.g., heavy metals such as mercury), which are more prevalent in our current environment than in the past. Those with ASD (or those who are at risk) may be especially vulnerable, as their ability to metabolize and detoxify these exposures can be compromised.

### **What are the heavy metals?**

These include methylmercury, arsenic, lead and cadmium, which enter human bodies through air, food and water, and over time can cause a range of illnesses and organ damage, including cancer; damage to the kidneys, GI tract and nervous system; and even death. These toxins are particularly dangerous to infants, fetuses and children (see [We're Loaded with Toxins: Analyzing the Toxic Body Burden of Americans](#) by Judy Chinitz Gorman).

### **Is mercury exposure a contributor to ASD?**

The role of mercury as a risk factor for childhood autism is not fully understood; however, it has been shown that mercury can interfere with the signaling pathways in a child's developing brain and the modulation of proteins that regulate the immune system

(see [Understanding Mercury, Understanding Autism](#) by Ellen Silbergeld, Ph.D., and Jennifer Nyland, Ph.D.).

### **How do genes and environmental exposures interact in ASDs?**

Genes may contribute to a child's diagnosis of autism or other ASD, not because they directly influence the developing nervous system, but because they affect the child's biologic response to an environmental exposure that dysregulates the developing brain (see [Epidemiologic Approaches to Autism and the Environment](#) by Craig J. Newschaffer, Ph.D.).

### **Are autism rates in other countries rising?**

Rising rates of autism are being reported worldwide. In Hong Kong, for example, researchers believe that rising autism rates among children are associated with elevated methylmercury levels, primarily from the large amount of fish consumption there. Methylmercury is absorbed into the blood after ingestion and, in pregnant women, it readily crosses the placenta into the fetal circulation system, and then to the brain (see [Fish and Industry Toxins: A Link to Rising Autism Rates in Hong Kong and China](#) by Kulani Mahikoa).

### **What is a toxic "body burden"?**

This refers to the industrial chemicals, caused by pollutants, pesticides and other chemicals, which have been found in human blood, urine and breast milk (see [We're Loaded with Toxins: Analyzing the Toxic Body Burden of Americans](#) by Judy Chinitz Gorman).

### **What is the relationship between environmental toxins and ASD?**

Findings indicate that many children with autism or those who are at risk of developing autism have a metabolic impairment that reduces their ability to rid their bodies of heavy metals and other toxins. Build-up of these toxins in the body can lead to brain and nervous system damage and developmental delays (see [We're Loaded with Toxins: Analyzing the Toxic Body Burden of Americans](#) by Judy Chinitz Gorman).

### **Are pesticides a potential contributor to ASD?**

Some children who are genetically at risk for ASD may be more susceptible to the adverse effects of pesticide exposure. Research shows that several genes associated with autism risk encode for proteins that regulate excitation/inhibition within the central nervous system. Several of these neurotransmitter systems are known to be targets of pesticides frequently found in children (see [Can Exposure to Environmental Toxicants Influence Autism Susceptibility?](#) by Isaac N. Pessah, Ph.D.).

### **What is autoimmunity and what is its relationship to ASD?**

Autoimmunity is a condition in which the immune system attacks the body's own tissues. Several studies show that autoimmune activity can be associated with ASD in some cases, but it has not been determined if this activity contributes to the development of the disorder or if it is a consequence of the disease (see [Autism Spectrum Disorders and the](#)

[Immune System](#) by Paula Goines, B.S., Paul Ashwood, Ph.D., and Judy Van de Water, Ph.D.).

### **How is the digestive system related to ASD?**

Autism may cause alterations in the beneficial bacteria that inhabit the digestive tract, leading to digestive disorders, such as diarrhea and constipation. Some symptoms are worsened by certain foods, such as milk or wheat products (see [Canadian Study: Is There a Digestive Link to Autism?](#) by Kulani Mahikoa).

### **What is the link between the digestive system and the brain in people with ASD?**

Some of these bacterially produced compounds (mentioned above), known as short-chain fatty acids, when injected in small amounts into the brains of experimental rodents, produce bouts of hyperactivity and repetitive behavior resembling those seen in ASDs. Research shows that repeated exposure to these compounds can exert permanent effects on brain and behavior (see [Canadian Study: Is There a Digestive Link to Autism?](#) by Kulani Mahikoa).

### **How are the immune and nervous systems related to ASD?**

Research suggests that problems with the immune system may be one of the causes or consequences of ASD. Psychological stressors, exposure to chemical triggers and infectious agents may work together to adversely influence the immune system. Children at risk of ASD may be particularly susceptible to chemical/environmental triggers of improper immune responses that impact the developing nervous system (see [Can Exposure to Environmental Toxicants Influence Autism Susceptibility?](#) by Isaac N. Pessah, Ph.D.).

### **What is a Toxicant-Induced Loss of Tolerance (TILT)?**

TILT is a two-step disease mechanism that has emerged in medicine over the past decade. Following acute exposure to a contaminant, some genetically susceptible subjects then lose tolerance for everyday exposures, which are often unrelated to the original exposure. There is strong suspicion that TILT could result in ASDs (see [Environmental Exposures and ASDs: Making the Connection](#) by Claudia S. Miller, M.D., M.S.).

### **Have some children with autism recovered from ASD?**

There are reported cases that some children with autism have substantially or completely recovered. Commonweal, a non-profit health and environmental research institute, is conducting an autism recovery documentation project that will provide a detailed report of a number of verifiable recoveries from ASD (see [Helping to Shift the Paradigm: Learning More About Recovery in Autism](#) by Robert Sinaiko).

### **How is the science of epidemiology helping to discover links between environmental exposures and diseases such as autism?**

By studying how health outcomes are distributed across populations, epidemiologists learn what factors are likely to increase risk of disease. The two most common approaches for establishing that environmental factors contribute to causing a disease (such as ASD) are to contrast disease rates in a single population at different points in

time and to compare disease rates at the same point in time across different populations (see [Epidemiologic Approaches to Autism and the Environment](#) by Craig J. Newschaffer, Ph.D.).

### **What is the Environmental Working Group?**

The Environmental Working Group (EWG), a watchdog environmental organization, has been conducting environmental investigations since 1993. Its team of scientists, engineers, policy experts, lawyers and computer programmers carries out research to expose threats to our health and the environment, and works to find solutions (see [We're Loaded with Toxins: Analyzing the Toxic Body Burden of Americans](#) by Judy Chinitz Gorman).

### **What is the Toxic Substances Control Act?**

The TSCA (15 U.S.C. s/s 2601 et seq.), enacted by Congress in 1976, gives the Environmental Protection Agency the ability to track industrial chemicals currently produced or imported into the United States. The EPA screens these chemicals and can require reporting, testing or banning of those that may pose an environmental or human-health hazard. However, the TSCA does not require companies to test chemicals before they notify the EPA of their intent to manufacture them (see [We're Loaded with Toxins: Analyzing the Toxic Body Burden of Americans](#) by Judy Chinitz Gorman).

### **What is the Kids Safe Chemicals Act?**

The Kids Safe Chemicals Act is a Senate bill, introduced by Senators Lautenberg and Jeffords, that would require chemical manufacturers to provide health and safety information on chemicals used in consumer products instead of presuming a substance is safe until proven dangerous (see [We're Loaded with Toxins: Analyzing the Toxic Body Burden of Americans](#) by Judy Chinitz Gorman).

### **What is the M.I.N.D. Institute?**

The Medical Investigation of Neurodevelopmental Disorders (M.I.N.D.) Institute of the University of California, Davis, is an interdisciplinary biomedical center that conducts research into the causes and treatment of autism, fragile X syndrome, learning disabilities and other neurodevelopmental disorders (see [The UC Davis M.I.N.D. Institute: Uniquely Designed to Study Gene-environmental Interactions in Autism](#) by Robert Hendren, D.O.).

### **What are the CHARGE and MARBLES projects?**

These are two new projects being undertaken by the Center for Children's Environmental Health at the University of California Davis. Childhood Autism Risks From Genetics and the Environment (CHARGE), the first and largest case-control study of autism, will look at the influence of environmental factors, the role of genetic susceptibility and the interplay between the two. Markers for Autism Risk in Babies Early Learning Signs (MARBLES) will study women who have a child diagnosed with autism and who are pregnant or plan to become pregnant in the near future to find out if anything that occurs during pregnancy can be associated with a later diagnosis of autism (see [The UC Davis M.I.N.D. Institute: Uniquely Designed to Study Gene-environmental Interactions in Autism](#) by Robert Hendren, D.O.).

**What is the Autism Phenome Project?**

This M.I.N.D. Institute project aims to distinguish among subgroups or phenotypes of autism by evaluating children with autism on several levels and analyzing the data to detect patterns that can be used to define different types of autism (see [The UC Davis M.I.N.D. Institute: Uniquely Designed to Study Gene-environmental Interactions in Autism](#) by Robert Hendren, D.O.).

**What is an Environmental Medical Unit?**

An EMU is a specially designed and constructed residential or hospital facility providing a short-term stay for a child with ASD. During the stay, the child's symptom triggers are identified so that they be avoided and eventually tolerated again. Although they do not yet exist in the U.S., EMUs would allow researchers to see and identify the role of exposures in ASDs and other illnesses (see [Environmental Exposures and ASDs: Making the Connection](#) by Claudia S. Miller, M.D., M.S.).

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