



The Role of Cumulative Impacts In Assessing Autism Risk

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A study conducted by the Harvard School of Public Health (published in the June 18, 2013 edition of *Environmental Health Perspectives*¹), finds increased incidence of autism among children living in areas of higher air pollution as measured by the Environmental Protection Agency (EPA.) This study is the tip of the iceberg, revealing that what we don't know about how toxic exposures combine can hurt our children.

The Reality of Unstudied Toxic Exposures

Over the human life span, people receive multiple exposures of all types, from toxins and synthetic chemical ingredients in foods, agriculture, medicines, and personal care products, to industrial contaminants in air, water, soil and food. Many kinds of toxic ingredients are never studied for their singular human health effects, no less for their cumulative health effects.

The President's Cancer Panel Report (PCPR) of 2010 indicated that the buildup of accumulated toxins within people's bodies is a prime contributor to cancer. Both the National Academy of Sciences, and the PCPR identify research into the cumulative impacts of toxic exposures as a missing link in addressing serious health issues, like autism and cancer.

Our health scientific research model studies one substance at a time, yet people are exposed to and retain many chemicals and other kinds of toxins. An assessment of umbilical cord blood done by the Environmental Working Group (EWG)²

¹ "Perinatal air pollutant exposures and autism spectrum disorder in the children of Nurses' Health Study II participants," Andrea L. Roberts, Kristen Lyall, Jaime E. Hart, Francine Laden, Allan C. Just, Jennifer F. Bobb, Karestan C. Koenen, Alberto Ascherio, and Marc G. Weisskopf, *Environmental Health Perspectives*, online June 18, 2013: <http://ehp.niehs.nih.gov/1206187/>

² "Tests Find More Than 200 Chemicals in Newborn Umbilical Cord Blood," Sara Goodman, *Scientific American*, December 2, 2009

showed that even newborns have accumulated over 200 chemical toxins in utero.

Health Impacts On Children

The effects on children of unstudied and unregulated chemicals can be more critical. When harmful substances combine and interact within a fetus, baby, or child's biology, the effects can be far-reaching and ongoing — more so than what adults experience. Just as a plant seedling sends out a tiny tendril that evolves into stem, root, leaf and flower — so do tiny humans grow and specialize their parts, systems, and functions most intensively in the earliest years of life. And at least from conception, outside outputs can and do regularly enter and intervene in that biological evolution.

Whether it's pesticides in grain, hormones in dairy, fracking chemicals seeping into water supplies, volatile organic compounds in the air, endocrine disrupters in personal care, or (as the Harvard researchers found) diesel, particulate matter and mercury from nearby traffic, a range of material outputs may skew or derail that baby or child's delicate growth process.

In order to get a handle on these risk factors, we turn to science. But that science is over forty years behind and has never studied over 80,000 toxic chemicals currently in wide use. Studying each one is valid and absolutely essential— but it's only a beginning. Health care science must account for these basic factors for assessing health risk:

- It's rare to experience exposure to just one toxic source
- Toxic outputs combine within us
- Depending on health status and predisposition, individuals respond differently

In a study, a single chemical can be isolated, but that does not replicate the actual conditions within the human body. In the

human body, chemicals interact constantly and produce a chain of reactions.

Exposure to Multiple Toxic Sources

Considering the risk factors and possible contributors to ailments like autism surfaces the challenges and shortfalls of targeting a single agent. For example, let's recall the debate over the vaccine ingredient thimerosal, a form of mercury that has been used as a preservation in many types of vaccines (although currently it is eliminated or reduced in childhood vaccines.) The vaccine research undertaken to demonstrate that "vaccines don't cause autism" focused solely on this single vaccine ingredient, mercury. By the logic of this type of research, the mercury in vaccines either "causes" autism— or it doesn't.

But how valid is this "either-or" formulation? The singular research model fails to account for cumulative exposures. As per the Harvard study, many other factors could come into play to increase or decrease risk from a single ingredient. For example, suppose that any (or all) of the following factors were present to increase a fetus' prenatal exposure to mercury:

- The family lives near a high traffic area where there is mercury pollution
- The family regularly eats high mercury fish, like tuna
- Mom has a mouth full of mercury amalgam filling
- Mom gets regular thimerosal-containing flu shots

What are the implications of other co-existing exposures? By the time a baby receives the series of shots containing thimerosal, he or she already may have already received significant mercury exposure, potentially increasing risk for autism. The shots may have *added to* prior mercury levels and increased them beyond what was tolerable. But there is no medical assessment done before vaccination to assess a newborn's prior exposures.

When Toxic Exposures Combine

The Harvard study found other lower grade exposures to lead, manganese, and methylene chloride, which were also implicated in increased autism incidence. According to the Harvard research, "EPA reviews have indicated that all of these pollutants have established or suspected effects on the nervous system and on the developing fetus." How do those toxins interact with diesel particulate matter and mercury? Do these toxins potentiate, when combined? Scientists don't know. Nor is much known about how other vaccine ingredients (beyond mercury) interact with each other. Or how they combine with other toxic sources.

Individual Health Status

Because nut allergies are now so common, foods are labeled so that parents can avoid feeding their kids foods containing nuts or prepared in facilities where nuts are packaged. This is just one example of how differently individuals respond even to a single substance, such as a food, medicine, or chemical. It's no surprise that complex treatments with multiple ingredients can produce unintended effects. Yet vaccination guidelines fail to predict these responses nor to allow modifications in the vaccine schedule based on these individual differences.

If an individual child has a high pre-existing load of mercury, diesel particulates, or other chemicals prior to vaccination, their response to vaccination may differ from that of a child with low exposure.

And what about pre-existing health status? Although no research has implicated any single gene in autism, a given individual's biochemical capacities, genetic predispositions, and family history of allergies will all contribute to their current health status.

Depending on health status, any shot or series of shot cannot be assumed to produce the same effect on each person. Through not assessing the factors— like pre-natal proximity to traffic pollution and others— that tend to increase (or lower risk) of autism, it's impossible for science to predict any individual's response to one or more shots, or to any other complex health intervention.

With one child in fifty now suffering from autism, we cannot ignore the role of cumulative exposures and pre-existing health status on increased or decreased vulnerability to reactions.

Accurately assessing risk factors entails reconsidering the absolute allegiance to double-blind "one substance at a time" science, as the only form of scientific study (or the only pathway to constructive health treatments.) New clinical evidence of a multi-factorial approach to autism prevention, mitigation and treatment should inform public health care policy in order to help both children and their families prevent and cope with the terrible health and economic burden that autism imposes. So long as autism rates continue the current inexorable rise, health care researchers cannot claim to have understood this ailment and all its contributors. As a result, public policy needs to account for scientific shortfalls through adjusting policies that reflect these realities:

1. We are unlikely to find a sole cause for autism

2. We are more likely to find many interactive contributors to autism
3. Cumulative exposures play a key and unassessed role
4. Individual health status increases or decreases risk

Therefore, reducing and preventing autism will inevitably entail reducing exposure to any and all contributors, especially for those most at risk. As a result, in place of unilaterally recommending this (or any) health treatment for all individuals, public policy makers will need to account for science's current omissions in two ways:

1. Public education about varied contributors and risk factors to help parents limit their own and their family's exposures.
2. Increased latitude for parental choice in timing and number of vaccinations based on children's health risk and status and family history. Parental responsibility for assessing risk factors will

complement physician assessments in an overburdened health care system.

It's not uncommon for any enterprise to require mid-term course corrections. Rising rates of autism in the context of scientific research shortfalls dictate a course correction in this policy arena.

Alison Rose Levy is a journalist who has been in the major media for over twenty years, covers the wide range of areas that affect health, such as food, the environment, health care, health science and research, activism, media and marketing of health, treatments, public policy, regulation, and legislation, and the health, drug, food, agricultural, and energy industries. Alison hosts the radio program "Connect the Dots" on the Progressive Radio Network, and reports for AlterNet, Eco-Watch and the Huffington Post, as well as regularly contributing articles to Citizens for Health.

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