

## Will my child be born autistic if I eat GMOs? A scientist's view

Cyberspace has been awash with claims over the past two weeks that glyphosate, an herbicide used with some genetically modified crops, causes autism. "Half of All Children Will Be Autistic by 2025, Warns Senior Research Scientist at MIT," [blared](#) a headlined article on a natural products website that was shared by more than 100,000 people. Other sites had similarly headlined articles.

Similar near hysterical claims appear like clockwork every few months on the Internet, promoted by natural products and supplement sites working in concert with anti-GMO activists. The alleged link between autism and GM foods is heavily promoted by [notorious](#) alternative medicine and natural products advocates, such as [Dr. Joseph Mercola](#), as well as by [Jeffrey Smith](#), the [controversial founder](#) of the anti-GMO one-man Institute for Responsible Technology. Mercola even promotes a Smith video headlined: "Monsanto's Roundup Herbicide May Be Most Important Factor in Development of Autism and Other Chronic Disease".

**[Editors' suggested reading: [Mother's science-based view: Organics and Whole Foods are 'scam of the decade'](#)]**

Is there any truth to the claims of a GMO-glyphosate-autism link?

The autism spectrum disorder (ASD) is characterized by "[difficulties in social interaction, verbal and nonverbal communication and repetitive behaviors](#)". There is a broad range in the severity of these symptoms, which is why the term "spectrum" is used in the definition of the disorder. It is hypothesized that there are [multiple causes for ASD](#), including genetic, epigenetic and environmental factors. The heritability of autism has been studied in twins and historical data suggest 80-90 percent values, while more recent data using different ascertainment criteria suggest roughly 50 percent heritability.

[A study in 2011](#) found that the recurrence risk of autism is ~19 percent in infants if an older sibling is autistic, with a roughly three-fold increase in risk if the infant is male and a two-fold increase in risk if there is more than one older sibling with autism. [A recent review](#) highlighted that a genetic cause can be elucidated in 10-30 percent of cases of ASD depending on the technology used and cohort examined, and that exome and whole genome sequencing of ASD patients has led to the discovery that there are "hundreds of genes" involved in the disorder.

However, genetics [does not account for all cases of autism](#) and many studies have focused on identifying non-genetic causes of ASD. Environmental risk factors that have been associated with ASD include [parental age](#), [pre- and perinatal complications](#) (particularly respiratory distress), [air pollution](#), [maternal use of valproate](#) and [maternal exposure to pesticides](#), among others. It is this last factor that is being exploited by Mercola and Smith to fuel their campaign against genetically modified foods.

I do not use the word "exploit" lightly, but can find no better term. The link between autism and GMOs is most often restricted to the criticism of glyphosate-use. Glyphosate, which is the active ingredient in Monsanto's RoundUp, is used on genetically modified crops that are made to resist this herbicide.

However, whether you are searching for a link between autism and GMOs or autism and glyphosate, your findings can be summarized in one brief sentence: “there is no data that I could find”.

Throughout the course of doing research for this piece, I contacted several research scientists including my former lab, which is now one of Canada’s leading autism research laboratories and part of a project that is sequencing the genomes of 10,000 ASD patients (note that I am not an ASD research scientist). My request for an opinion on the topic was passed from one research scientist to the next and across the board, I got the same message: “there is no evidence-based data we are aware of.” That is not to say that a link does not exist or may not be identified in the future, but as I write this article, there is no credible research linking GMOs to autism.

However, the memes and websites preying on the fears of parents and the vulnerabilities of those with autistic children abound, which is why I consider this to be exploitation of the worst sort. The recent spate of articles and [Mercola’s website](#) feature interviews or talks by Dr. Stephanie Seneff, a Massachusetts of Technology [computer scientist and electrical engineer](#) who has written about autism and glyphosate. Seneff, whose previous work include [a thoroughly lambasted paper](#) in a low tier journal claiming a “link” between autism and vaccines, also [wrote a paper in 2013](#) in a similar marginal journal outlining a hypothetical link between glyphosate and multiple disorders, including “gastrointestinal disorders, obesity, diabetes, heart disease, depression, autism, infertility, cancer and Alzheimer’s disease.”

Neither paper included any novel research. But her work was legitimized by Carey Gillam, a reporter for Reuters, whose [news story](#) was headlined “Roundup linked to health dangers”.

Seneff’s latest claim, eagerly promoted by anti-GMO alternative medicine sites, is that half of the US childhood population will be born autistic within 10 years as a result of GMO use:

At a conference last Thursday, in a special panel discussion about GMOs, she took the audience by surprise when she declared, “At today’s rate, by 2025, one in two children will be autistic.” She noted that the side effects of autism closely mimic those of glyphosate toxicity, and presented data showing a remarkably consistent correlation between the use of Roundup on crops (and the creation of Roundup-ready GMO crop seeds) with rising rates of autism. Children with autism have biomarkers indicative of excessive glyphosate, including zinc and iron deficiency, low serum sulfate, seizures, and mitochondrial disorder.

A fellow panelist reported that after Seneff’s presentation, “All of the 70 or so people in attendance were squirming, likely because they now had serious misgivings about serving their kids, or themselves, anything with corn or soy, which are nearly all genetically modified and thus tainted with Roundup and its glyphosate.”

[Multiple reviewers](#), including most recently David Gorski, a surgical oncologist and well known science blogger, have [noted](#) the incoherent nature of Seneff’s claims and papers and the pay-for-play nature of the publishing journal. Seneff hypothesized that glyphosate causes nutritional deficiencies and systemic toxicity, primarily by impacting the bacteria in the gut, yet fails to provide any evidence supporting her

hypothesis.

There have been very few studies that have specifically examined glyphosate and ASD. In 2007, [one study](#) examined maternal exposure to pesticides during gestation and ASD among children in the California Central Valley. The pesticides selected for analysis were based on the toxicological and physical properties of the compound, as well as substances that were of community concern. The final list of pesticides included in the analysis lists glyphosate, yet fails to find association between maternal exposure to the chemical and ASD.

Pesticide use is recorded in the United States and there are multiple databases that house this information, ranging from [the amount of pesticide used](#) to the exposure that handlers have experienced. As such, it stands to reason that if glyphosate were associated with autism, there would be more instances of ASD in regions of the U.S. where glyphosate use is high. Geographic clusters of ASD cases do exist in the U.S. (see [here](#) and [here](#) for example studies), but the analysis of these clusters has not identified glyphosate exposure as a possible cause, despite the availability of data.

The onus is on the researcher to disprove the null hypothesis, i.e. to prove that something exists or that there is a link. Until that point in time, there is no link. Seneff points to glyphosate as the cause of autism based on her observation that glyphosate use has increased while the rate of autism has increased in the same time period. Seneff [states](#), “I’ve watched the rate of autism skyrocket in the last five years. It’s extremely scary. One in 150, one in 100, one in 88, and the most recent numbers from March 2013, one in 50... You do the math... 20 years from now every other boy in this country will be diagnosed on the autism spectrum.”

Yet [the Center for Disease Control and Prevention has stated](#) that “the recent prevalence increase [of ASD] is likely attributable to extrinsic factors such as improved awareness and recognition and changes in diagnostic practice or service availability”. This is supported by the fact that recent statistics have noted an increase in the incidence of autism in specific populations and racial backgrounds, suggesting increasing awareness in such groups. But for the sake of argument, let’s acknowledge that there has been an increase in the occurrence of autism. The link is a classic case of association with no causation.

There’s a plethora of items whose prevalence or use has increased during the past 20 years: the number of electronics we own, the number of pedicures women get, the amount of coffee we drink, etc, and each would make an equally convincing [graph](#) if their rate was compared to the incidence of ASD over time. This is not to say that glyphosate should not be studied; yet until a link is identified, its association with ASD is equivalent to that of [eating organic food](#), whose sales have also risen in tandem with the increase in incidences of autism.

Image not found or type unknown

GMOInside.org, an organization that promotes the labeling of GM ingredients, also has an article promoting the autism-GMO link on its site. The article shares anecdotal stories about the commonality of gastrointestinal symptoms between autistic patients and GMO-fed animals. Gastrointestinal symptoms in patients with ASD are well documented and [recent funding grants](#) will infuse hundreds of thousands of dollars to better understand this relationship. But as it stands today, “there is no data”.

I’ve searched [publication databases](#) to find a scientific article providing evidence for gastrointestinal symptoms associated with GMOs and was unable to find even one. Additionally, glyphosate is not used exclusively on GMOs: it is used for a wide-range of different applications including “weed control in vineyards, olive groves, fruit orchards, grass pastures, forestry, parks, gardens and underwater usage in rivers and lakes”. In fact, it could not be avoided through a GMO labeling law or ban.

There are those who will read this article and will conclude that research has not been done examining the link between autism and GMOs because corporate interests have silenced researchers, that corporations paid off scientists or that universities threatened to cut off funding. However, I think that there are very few scientists who wouldn’t give their life savings and the naming rights for their first born for the opportunity to identify an environmental cause for autism. Monsanto, Dow Agro, and Syngenta combined aren’t big enough to silence that. The reason it hasn’t been examined is far simpler: there is no likely connection based on the known comparatively benign toxic profile of glyphosate and most researchers do not want to waste their time and effort and precious limited support dollars on a project that would most likely find no association with ASD.

Although the world of science has tried to study [the emotional toll that ASD takes on families](#), I think that there’s nothing that could fully describe the full range of emotions that parents experience when their child is diagnosed with ASD. I know I’m lucky to be the parent of a healthy and rambunctious toddler, and I feel arrogant even imagining myself in the shoes of families with ASD. But there is one thing that I know that I share with all parents: we are equally concerned about the health and well-being of our children.

I wrote this article more harshly than I generally would and condemned scientists for poor research more strongly than I generally would because they have made conclusions where none are to be made and would have us believe facts where none exist by exploiting the concern we have for our children. So

rather than listening to the advice of Mercola, Seneff or Smith, consult your pediatrician or GP and have them address any concerns that you may have about your family's diet.

Note: This piece, in large measure, was originally posted on May 9, 2014

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