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Are C-Sections Contributing to Autism?

Analysis by Dr. Joseph Mercola | December 23, 2023

STORY AT-A-GLANCE

- Studies have found an association between C-sections and autism. In one, children born by C-section had a 21% higher risk for developing autism
- Folate deficiency has been shown to raise a child's risk of autism by inhibiting detoxification of pesticides. Optimizing folate intake during pregnancy has been shown to ameliorate this risk
- Women who took prenatal vitamins — which include folic acid — lowered their child's risk of autism by as much as 30%. Another study found that taking the recommended amount of folic acid at conception lowered the child's risk of pesticide-related autism specifically
- Pesticides, especially glyphosate, and C-sections both have an adverse effect on the child's gut microbiome, thereby raising the risk of autism
- Glyphosate is widely used on genetically engineered crops, and the pesticide cannot be washed off, as it's taken up into every cell of the plant. As a result, nonorganic foods are proving to be a significant source of glyphosate exposure

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A well-respected natural-birth pioneer, Dr. Michel Odent, has a theory about what might be behind our rising autism rates: C-sections. While C-sections and autism may initially seem completely unrelated, there is in fact an intriguing connection between the two — a connection that lead back to the gut.

We now know that C-sections alter the microbiome in the child, and a number of studies, as well as clinical observations, suggest a disrupted gut flora may act as a trigger for autism. Research linking folate deficiency to autism supports this theory, as folate has been shown to aid in the detoxification of pesticides — chemicals known to increase the risk of autism by destroying beneficial gut bacteria.

Might C-Sections Increase a Child's Risk of Autism?

As reported by The Guardian:[1] "[Odent] has interpreted epidemiological studies that show that a high number of children born by cesarean section or induction go on to be diagnosed with an autism spectrum disorder in support of his theories … He is also fascinated by research into epigenetics … and studies that investigate how the maternal microbiome … might affect a baby's development in pregnancy, delivery and infancy.

He is most passionate about advancing his theory that altering the way women conceive and give birth is changing humanity at an evolutionary level." Odent believes the following three factors may be partly responsible for rising autism rates by triggering a genetic predisposition for autism:

- The use of synthetic oxytocin to induce labor
- Changing environmental conditions in the womb
- The increasing trend of elective C-sections

He bases his theory on C-sections as a contributing factor to autism on two large longitudinal studies that show an association between the two. One study, which had a cohort of nearly 2.7 million children, found that those born by C-section were 21% more likely to be diagnosed with autism.[2,3]

Proposed reasons for this link include exposure to anesthesia drugs, preterm delivery and elevated stress responses. It's a controversial position, to say the least, and many disagree with his interpretations and theories. As noted in the featured article:[4]

> *"Dr. Carole Buckley, the Royal College of General Practitioners' clinical representative on autism, is disturbed by the hypothesis: 'There is no evidence to support the claims in this book and it is extremely unhelpful of Dr. Odent to make them.*
>
> *Suggesting that inducing labor or delivering a baby via caesarean may lead to autism is irresponsible. It will only increase anxiety and feelings of guilt or inadequacy that women often feel when they need intervention to give birth to their babies.'"*

Odent defends his position saying his book, "The Birth of Homo, the Marine Chimpanzee: When the Tool Becomes the Master," is not geared toward pregnant women. In fact, he urges them not to read it. Rather, the audience he's trying to capture are "people interested in thinking in terms of the future and the future of the species."

In other words, while medical advances such as C-sections are a blessing for individuals whose lives can be saved by them, from a long-term societal perspective, radical alterations from nature's ways has a price, and increased prevalence of autism may be one.

The Importance of Gut Microbiome in Autism Highlighted yet Again

The study showing C-section raised the risk of autism by 21% was careful to note that the procedure was not causative. Rather, the researchers speculate that "some unknown genetic or environmental factors may lead to both."[5] The question is what? It's also interesting to note that while the global rate of autism is 0.62%, the U.S. reports a rate of nearly 1.5%.[6] What might account for this significant discrepancy in prevalence?

Again, a factor that might explain the association between C-section and autism is the disruption of the gut microbiome. The importance of gut microbes was again highlighted in research showing folate (vitamin B9, the synthetic version of which is folic

acid) helps mitigate pesticide-related autism. Low folate has been shown to play a role in a number of neurological disorders.

Folate is naturally produced by certain gut microbes, and since glyphosate disrupts the gut microbiome, it may lead to a decreased ability to produce folate, thereby inducing folate deficiency and related health problems, including autism. Two studies support this hypothesis. In one,[7,8] women who took prenatal vitamins — which include folate — lowered their child's risk of autism by as much as 30%.

In the other,[9,10] they found that taking the recommended amount of folate at the time of conception lowered the child's risk of pesticide-related autism specifically. A reason for this appears to be because a lack of this vitamin inhibits detoxification of pesticides. Pesticides are not only toxic to the developing brain,[11] like C-section, pesticides also have an adverse effect on the microbiome.

Women whose folate intake was less than 800 micrograms [mcg] per day (the amount in most prenatal vitamins) and were exposed to pesticides had a much higher estimated risk of having a child who developed an autism spectrum disorder (ASD) compared to those who took the recommended amount (800 mcg/day) and had no pesticide exposure.

Not surprisingly, repeated pesticide exposures resulted in increasingly higher risk of having a child with ASD. Those at greatest risk were mothers with the greatest exposure to pesticide and the lowest folic acid intake. While this study did not establish a causal link, Rebecca J. Schmidt, assistant professor in the department of public health sciences and lead author of the paper noted that:

> *"Folate plays a critical role in DNA methylation (a process by which genes are turned off or on), as well as in DNA repair and synthesis. These are all really important during periods of rapid growth when there are lots of cells dividing, as in a developing fetus. Adding folic acid might be helping out in a number of these genomic functions."*

Folate Deficiency Must Be Avoided During Pregnancy

Toxic exposures from multiple sources, including the mother, while in utero,[12] have been cited as a risk for autism on numerous occasions. One source in particular that has been repeatedly pointed out is pesticides, glyphosate in particular, and the U.S. is a leading user of this chemical. Nearly 300 million pounds of glyphosate are sprayed on food crops each year in the U.S. Since its introduction in 1974, over 3.5 billion pounds of glyphosate have been applied to American fields.[13,14]

Glyphosate is widely used on genetically engineered crops, and the pesticide cannot be washed off, as it's taken up into every cell of the plant. As a result, nonorganic foods are proving to be a significant source of glyphosate exposure. Aside from increasing a child's autism risk in the ways already mentioned, mothers exposed to pesticides during pregnancy are also at increased risk of premature delivery,[15] which just so happens to be yet another risk factor for autism.[16]

Monsanto, which manufactures and sells the best-selling glyphosate-based herbicide Roundup, has maintained that Roundup and glyphosate (the active ingredient) are harmless, but Stephanie Seneff, Ph.D., a research scientist at the Massachusetts Institute of Technology and Anthony Samsel, Ph.D., a research scientist and environmental and public health consultant, have discovered and published papers explaining the mechanisms by which glyphosate contributes to chronic disease and brain disorders such as autism, and it all goes back to the adverse effects the chemical has on the gut microbiome.

Glyphosate Kills Folate-Producing Gut Bacteria

Last year, Seneff wrote an article[17] in which she pointed out that a few years after the introduction of Roundup Ready corn and soy in the U.S., incidence of spina bifida started to increase — a birth defect associated with folate deficiency. This increase was in fact what alerted the U.S. government to the fact that this vitamin deficiency was becoming a widespread problem again.

As a result, federal regulations were enacted in 1998, requiring fortified wheat products to contain folic acid. Interestingly enough, Seneff and Samsel's work shows that by disrupting gut microbes, glyphosate may actually induce folate deficiency (as certain gut bacteria produce B9).

She believes that by requiring foods to be fortified with folic acid and encouraging pregnant women to take supplemental folic acid, the fact that glyphosate is causing birth defects and neurodevelopmental problems — by way of destroying gut bacteria — remains hidden. She writes:[18]

> *"In fact, it is a direct hit: folate is produced from products of the shikimate pathway, and this is the pathway that even Monsanto admits is disrupted in plants and microbes by glyphosate. Furthermore, the microbes that synthesize folate for the host, lactobacillus and bifidobacteria, are the ones that glyphosate preferentially kills.*
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> *A continued rise in spina bifida would raise public awareness of a hidden environmental toxicant that might be causing this rise. Making sure that pregnant women were well supplied with external folic acid might mask the problem."*

Folate Versus Folic Acid

An important distinction needs to be made here. Although many scientists refer to folate and folic acid as if they were interchangeable, they are not actually the same. The active form is technically called methyltetrahydrofolate. Folic acid, the synthetic version of B9, is missing the methyl group and is already oxidized. As a result, few of the health benefits ascribed to folate actually hold true for folic acid. Overall, folic acid may do more harm than good.

Whereas folate plays a critical role in DNA methylation and prevents DNA mutations, thereby helping protect against breast and uterine cancer, folic acid has been linked to an increase in colorectal cancer.[19]

Studies have also confirmed that inactive folic acid remains present in the blood of postmenopausal women who take daily folic acid supplements, and that natural killer cells are diminished in the presence of elevated folic acid levels. Seneff believes the inactive folic acid increases the risk for cancer by binding to folate receptors, effectively preventing access by methyltetrahydrofolate.

Folic acid is also not metabolized in the same way as folate.[20] Naturally occurring folate is metabolized to tetrahydrofolate (THF) in your small intestine. Synthetic folic acid, meanwhile, is initially reduced and methylated in your liver, where the enzyme dihydrofolate reductase is required for the conversion of the folic acid into the active THF form your body can use (THF can even cross the blood brain barrier, which helps explain folate's usefulness against neurological disorders).

If you have low activity of this enzyme in your liver (which many do), and take high amounts of folic acid, you may end up with excessive levels of unmetabolized folic acid. Should you happen to have a methylenetetrahydrofolate reductase (MTHFR) gene mutation, problems may be further exacerbated.

MTHFR is an enzyme that converts folic acid into the active form of folate. Mutations in the gene that provides instructions for making MTHFR[21] results in a reduced ability to properly process folate and folic acid, and has been linked to a decreased ability to detoxify and a wide range of chronic health problems, including neurological diseases, birth defects and cancers.[22] I recommend avoiding folic acid for all of these reasons.

Recommended Folate Sources

Your best source of folate is food: leafy green vegetables, especially broccoli, asparagus, spinach and turnip greens.[23] If you need a supplement, I recommend using L-methylfolate (5-MTHF), a biologically active form of B9.[24] Carefully read the label though, as this biologically active form has a name that is hard to distinguish from a nonactive form, so, pay attention to each letter in the name:

- L-methylfolate and 6(S)-methylfolate are both biologically active forms of vitamin B9. Other names of these active forms include metafolin and quatrefolic
- D-methylfolate and 6(R)-methylfolate are biologically INACTIVE and should be avoided

Tackling Autism, One Pregnant Woman at a Time

In the lecture above, Dr. Suruchi Chandra discusses research findings showing how environmental toxins can influence ASD and reviews a number of safe, gentle natural treatment options that can be helpful.

Chandra also believes that the microbiome is likely key in understanding ASD, similar to the views of Dr. Natasha Campbell-McBride, whom I've interviewed in the past about her Gut and Psychology Syndrome (GAPS) Diet. Campbell-McBride's basic thesis is that the autistic child's microbiome was disrupted, either by:

- The mother's poor diet
- The mother's use of antibiotics or birth control pills
- Being delivered via C-section

In the first two cases, the mother transfers her impoverished microbiome to the child. In the case of C-sections, the child does not even have that benefit, as the mother's microbiome is transferred to the child as it passes through the birth canal.

This early disruption in the microflora, combined with other environmental variables, ends up wreaking both physical and neurological havoc. Chandra, like Campbell-McBride, finds the greatest improvements are typically seen once strategies that help heal the microbiome are implemented.

Chandra relies on a wide variety of diagnostic tools that most conventional psychiatrists would never think to use. If you have a child with autism or suspect any type of neurological condition, don't wait to start treatment, as early intervention is important. Seek the guidance of a knowledgeable integrative physician and/or psychiatrist who can

address the following variables and any others that need attention. For example, Chandra's protocol includes the following:

- **Gastrointestinal (GI) function —** To assess the child's GI tract, she begins by taking a family history and doing a physical examination. She also performs tests to assess the child's gut bacteria, level of inflammation and digestive function. If it's determined that the child cannot digest carbs, for example, she will recommend reducing or avoiding grains and using a digestive enzyme.

- **Immune function and chronic infections —** Many autistic children have evidence of immune dysfunction, such as autoimmune problems and/or excess inflammation, so she will also assess and prescribe support for the child's immune function. Diagnosing and treating chronic infections is a related component.

- **Mitochondrial health —** Mitochondria are organelles inside nearly every one of your cells. "They are, we now know, kind of the canaries in the coal mine. When there's some danger or stress, they're the first things that respond to the damage," Chandra says. Studies suggest 60% of children with autism have mitochondrial dysfunction, so this is a significant factor.

  There are tests that can indicate whether your child's mitochondria are affected. For example, low carnitine, coenzyme Q10 and certain amino acid ratios can signify mitochondrial dysfunction. If mitochondrial dysfunction is found to be part of the problem, adding more **healthy fats** to the diet, "healing and sealing" the gut and addressing any infections may help.

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