

# Autism and ADHD Linked to Disturbed Gut Flora Very Early in Life

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## STORY AT-A-GLANCE

- › The makeup of gut flora at birth and during the first year of life may play a key role in the development of neurodevelopmental disorders, including autism spectrum disorder, attention deficit hyperactivity disorder, communication disorders and intellectual disability
- › The research connected changes in gut bacteria in early life to neurodevelopmental disorders and identified early signs of mood and digestive problems
- › Children with three or more ear infections treated with antibiotics were more likely to develop a speech disorder, ADHD or an intellectual disability
- › Among children who developed neurodevelopmental disorders, higher levels of inflammatory Citrobacter bacteria and lower levels of beneficial Coprococcus were found in the microbiome
- › Antibiotics may be responsible for this effect, with researchers suggesting penicillin may increase Citrobacter while decreasing or eliminating Coprococcus

The makeup of gut flora at birth and during the first year of life may play a key role in the development of neurodevelopmental disorders, including autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD), communication disorders and intellectual disability.<sup>1</sup> Worldwide, 3.4 billion people suffer from health conditions that affect the nervous system.<sup>2</sup>

While much remains to be discovered about how early gut microbiota affect cognition, it's known that gut bacteria are involved in metabolism, neurological health, immune function and the health of the gastrointestinal tract. Further, gut-brain communication occurs via multiple avenues, including along the vagus nerve and through transport of short-chain fatty acids (SCAs).<sup>3</sup>

Gut microbes can also synthesize neurotransmitters, according to researchers with the University of Florida. In a study published in the journal *Cell*, they reveal that disruptions to gut flora in very early life may raise the risk of autism, ADHD and more.<sup>4</sup>

## **Gut Bacteria in Early Life Tied to Neurodevelopmental Disorders**

The study tracked a group of Swedish children from birth over a 20-year period to identify factors that might influence whether they develop a neurodevelopmental disorder. Researchers collected extensive data from early in the children's lives using detailed questionnaires about infections, antibiotic use, stress, prenatal conditions and family health history.

They also analyzed biological markers such as metabolites in umbilical cord blood and stool, types of body cell proteins and gut bacteria. Out of the 16,440 children monitored, 1,197 – or 7.3%<sup>5</sup> – were diagnosed with a neurodevelopmental disorder, and significant links were found between certain early-life factors and the likelihood of developing NDs.

Notably, the research connected changes in gut bacteria to these disorders and identified early signs of mood and digestive problems.

"The remarkable aspect of the work is that these biomarkers are found at birth in cord blood or in the child's stool at 1 year of age over a decade prior to the diagnosis," study author Eric Triplett said in a news release.<sup>6</sup> Interestingly, infants who went on to develop neurodevelopmental disorders were deficient in many bacteria known to promote gut health, including *Akkermansia*, *Bifidobacterium*, *Ruminococcus* and *Faecalibacterium*.

"*Akkermansia muciniphila* was associated with substances that contribute to the production of chemical signals in the brain known as neurotransmitters. These

neurotransmitters play a crucial role in brain function and mood regulation," the University of Florida reported.<sup>7</sup>

## **Antibiotics, Stress May Alter Microbiome, Contributing to Neurodevelopmental Damage**

The study also revealed that children who had three or more ear infections treated with penicillin from the time they were born until age 5 were at increased risk of NDs compared to those in the control group. Specifically, they were:<sup>8</sup>

- 3.89 times more likely to develop a speech disorder
- 3.27 times more likely to develop ADHD
- 2.44 times more likely to develop an intellectual disability

Further, among children who developed neurodevelopmental disorders, higher levels of *Citrobacter* bacteria, which are associated with inflammation, and lower levels of *Coprococcus*, which are linked to mental health benefits, were found in the microbiome. Antibiotics may be responsible for this effect, with researchers suggesting penicillin may increase *Citrobacter* while decreasing or eliminating *Coprococcus*.<sup>9</sup>

"We're not trying to say that antibiotics are necessarily a bad thing," lead study author Angelica Ahrens said. "But perhaps overuse can be detrimental to the microbiome, and for some children, for whatever reason, their microbiome might not recover as readily."<sup>10</sup>

Meanwhile, both environmental and emotional stress also increased the risk of NDs. Children whose mothers smoked during pregnancy were three times more likely to develop NDs, while toddlers exposed to secondhand smoke were 4.88 times more likely to develop ADHD. Toddlers whose fathers smoked more than 15 cigarettes daily were also 3.47 times more likely to develop autism.<sup>11</sup>

Further, among children later diagnosed with autism, higher levels of PFDA (perfluorodecanoic acid) were found. PFDA is a breakdown product often found in food packaging, especially those made to be grease-resistant, such as microwave popcorn

bags and fast-food wrappers.<sup>12</sup> "These substances are known to be associated with chronic inflammation, oxidative stress, immune suppression, and possible involvement in autoimmune diseases," the researchers noted.<sup>13</sup>

According to Ahrens, "There's a pretty consistent pattern where it seems increased stressors – whether from emotional stress or exposure to adverse health influences – can impact the immune system and, subsequently, the microbiome – along with all its downstream effects."<sup>14</sup>

## **Children Are Exposed to an 'Enormous Burden of Stressors'**

It's rarely just one factor that triggers a neurodevelopmental disorder or other chronic disease. Typically, it's a combination of factors – like processed food loaded with **linoleic acid**, childhood vaccines, antibiotic overuse and environmental pollutants – that causes gut dysfunction and other imbalances in the body.

Beth Lambert, who in 2009 founded Epidemic Answers, a research organization focused on helping children with autism and other chronic diseases, explained in our interview that it's the total load of modern living that often adds up to **chronic diseases like autism**:

*"It's what we call the total load of modern living. The total load is a concept that's been around for a very long time, especially in environmental medicine ... Patricia Lemer, who wrote a book called 'Outsmarting Autism,' first applied the concept of total load to neurodevelopmental conditions like autism, where she would say, basically, 'It isn't one thing that causes autism. It's really a perfect storm, a total load."*

*It's too many stressors of modern living on a body that doesn't have enough resources to withstand those stressors.'*

*Here's an example. Why is it that two children go into a pediatrician's office, one gets their 18-month vaccines and the other one gets their 18-month vaccines, one develops autism and the other one doesn't? Is it genes? Is it what the child*

*ate that day? Is it the fact that one child had a sickness and the other one didn't?*

*Was it because this child was on antibiotics when he had vaccines and this one wasn't? There are so many variables in each child and in each story. So, that's where I think the total load concept or total load theory really stands up is because there's so much medical literature on modern living and the ways that we live in the modern world and how it damages your health.*

*Inflammatory foods, processed foods, the enormous quantity of sugar that modern children consume, the number of pharmaceuticals children have, the antibiotics, for instance ... Antibiotics ... destroy your gut bacteria. What is the significance of that? That gut bacteria regulates everything from your immune system to your digestion of food and your metabolism.*

*So, all of those factors are going to impact a child, especially when they are in that critical developmental time. So, if you think about an infant and all the work they have to do to get to crawl, and walk, and talk, and relate to the humans in their lives, all of that takes an enormous amount of energy.*

*If their body is burdened with toxins from the laundry detergent, and from the mercury and cadmium on their toys, and from the inflammatory foods they're eating, and their vaccines and their antibiotics and their proton pump inhibitors ... that's when you're going to see them begin to develop symptoms, whether those are skin symptoms, like eczema, allergies, or whether it's neurodevelopmental symptoms.*

*As we're going through this developmental timeline, if you have an enormous burden of stressors, inflammation going on in your body, and you're supposed to be developing vision or speech, your body's too busy dealing with all those stressors, so you're going to have an arrested, impaired, or delayed development."*

## Are EMFs the No. 1 Risk Factor?

Electromagnetic fields (EMFs) are the cigarettes of the 21st century – and most people are being exposed 24 hours a day. Most of the radiation emits from cellphones, cell towers, computers, smart meters and Wi-Fi, to name just a few of the culprits.

Exposure causes serious mitochondrial dysfunction due to free radical damage. Among the most common consequences of chronic EMF exposure to your brain are chronic conditions like Alzheimer's, anxiety, depression and autism.<sup>15</sup>

Research published in Pathophysiology suggests autism may be associated with biological disturbances that are similar to the effects of EMF and radiofrequency exposures.<sup>16</sup> Martin Pall, Ph.D., also discovered a previously unknown mechanism of biological harm from microwaves emitted by cellphones and other wireless technologies via voltage gated calcium channels (VGCCs) embedded in your cell membranes.<sup>17</sup>

VGCCs are found in high concentrations in the brain, and research involving animals has shown that even low levels of microwave EMFs can have significant and varied effects on the brain. Studies suggest that when these VGCCs are activated by EMFs, it can lead to a range of neuropsychiatric effects.

At least 26 studies have linked EMFs to neuropsychiatric effects, and five specific criteria have been used to demonstrate that this relationship is causal, meaning EMFs can cause these effects.<sup>18</sup> While it's nearly impossible to avoid EMF exposure completely, there are practical ways to limit it.

Given the number of EMFs that bombard you all day long, getting educated about the negative effects of EMFs is imperative to your well-being. Particularly if you are dealing with a serious illness or **neurodevelopmental disorder like autism**, it is well worth your time to **reduce your EMF exposure** as much as possible.

One strategy is to connect your desktop computer to the internet via a wired connection and put your desktop – and cellphone – in airplane mode. Also avoid wireless keyboards, trackballs, mice, game systems, printers and house phones. Opt for the

wired versions instead. If you must use Wi-Fi, shut it off when not in use, especially at night when you're sleeping. Shutting off the electricity to your bedroom at night will also help reduce your exposure.

## How to Support a Healthy Microbiome

Avoiding antibiotics, including those found in conventionally raised meat, is key to keeping your microbiome health intact. Ultraprocessed foods, artificial sweeteners, chlorinated and fluoridated water and antibacterial products are other culprits that can worsen your microbial health.

Consuming fermented foods is an important step to increase microbiome diversity as well as decreases markers of inflammation.<sup>19</sup> If you do take antibiotics or are looking for another supportive measure for gut health, consider [spore-based probiotics, or sporebiotics](#). These are part of a group of derivatives of the Bacillus microbe and have been shown to dramatically increase your immune tolerance.

During pregnancy and in early life, vaginal delivery (versus [caesarean](#)), breastfeeding and exposure to older siblings can help establish a healthy microbiome during these crucial periods of development.<sup>20</sup> As noted by microbiologist Dr. Marty Blaser:<sup>21</sup>

*"Before modern times, microbes were transferred from mother to child during vaginal birth, from the mother's breast during nursing, through skin-to-skin contact, and from the mother's mouth by kissing.*

*Now, widespread cesarean delivery, bottle-feeding, extensive bathing (especially with antibacterial soaps), and especially the use of antibiotics have changed the human ecology and altered transmission and maintenance of ancestral microbes, which affects the composition of the microbiota.*

*The microbes, both good and bad, that are usually acquired early in life are especially important, since they affect a developmentally critical stage."*

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