

## **Understanding the Link Between Environment, Nutrition, and Autism, and Examining Approaches to Reduce Risk**

**Narrator:** You may have a loved one or friend who has been diagnosed with autism, but most people don't know that autism is actually a group of complex disorders involving brain development. Commonly referred to as autism spectrum disorder, or ASD, there is a wide variation in the type and severity of symptoms people experience.

I sat down with Dr. Rebecca Schmidt, an assistant professor in the Department of Public Health Sciences at the University of California Davis School of Medicine, to learn more about ASD and what researchers are discovering about this complex group of disorders.

**Schmidt:** Autism is a neurodevelopmental disorder characterized by difficulty understanding and using nonverbal social cues, such as eye contact, facial expression, gestures, body language, which can make it difficult to relate to others.

**Narrator:** Schmidt also notes that people with autism have language and communication deficits, restricted interest, and repetitive behaviors. Furthermore, Schmidt says that autism rates in children have risen.

**Schmidt:** The prevalence of autism spectrum disorders has been increasing over the last few decades. It now affects one in every 59 children in the United States, and it affects four males for every one female.

**Narrator:** Dr. Schmidt further notes that the risk for developing autism is 1 in 5 for children who have a sibling with the diagnosis. She stresses that there is no single known cause of ASD. In fact, researchers have been working to understand a variety of factors, including genetics, and more recently environmental contributors, that are associated with the increased risk for autism.

**Schmidt:** There's been a lot of research showing that there are many different genes that are encoding for different proteins that are associated with autism, and a lot of those proteins are involved in brain development, including the production, growth and organization of neurons and the connections between those neurons.

But also what people think of as environmental exposures, like air pollution and pesticides, have also been pretty consistently linked with increases for autism. There's a lot of different ways that environmental exposures can influence brain development.

My research goal is to advance understanding of how gestational and environmental exposures interact with the genome and the individuals' susceptibility, either genetically or with other background factors, to influence neurodevelopmental outcomes of children, and I tend to use a mechanistic and pathways perspective.

And so I lead several epidemiologic and mechanistic studies of autism, and that includes two high-risk autism sibling cohort studies where we're examining not only what exposures increase risk or protect against autism, but also the mechanistic pathways that they might work through.

**Narrator:** The ultimate goal of Dr. Schmidt's research is to find ways to prevent or reduce the risk for autism. Schmidt and her team are exploring how genetic factors or exposure to air pollution or pesticides increase risk for autism, and whether nutritional interventions, such as prenatal vitamins, help reduce the risk of ASD.

In particular, she has been researching the role of folate, a naturally occurring B vitamin that is also available in a synthetic form, called folic acid, which can be found in prenatal vitamin supplements and fortified cereals. Her team has found that taking folic acid during pregnancy, which is known to be critical for brain and nervous system development, was associated with about a 40% lower autism risk in children. Interestingly, her research suggests that folic acid during pregnancy may also help reduce the risk of ASD in children who are at a higher risk due to their genes.

**Schmidt:** We've published a few different papers looking at gene environment interactions in the context of autism spectrum disorders. This includes interactions between maternal prenatal vitamin intake near conception and the mom's genes and also her baby's genes. What we found is that if the mom or the child had certain gene variants and she didn't take prenatal vitamins, then the child was at higher risk for autism.

**Narrator:** Schmidt's team has also found that folic acid can help reduce the risk of ASD resulting from environmental exposures. For example, they found that if a mother was exposed to agricultural pesticides during pregnancy and she did not take a prenatal vitamin, her child had a much higher risk of developing autism than if she had used a prenatal vitamin. These findings were similar when they looked at other contaminant exposures, like air pollution, as well as other risk factors, such as having a sibling with the diagnosis.

**Schmidt:** We have found that prenatal vitamins taken by mothers in the first month of pregnancy is also associated with reduced recurrence of autism in high-risk families in the younger siblings of children who have autism. This is the first evidence for something that might be able to protect the recurrence of autism within high-risk families.

**Narrator:** While Dr. Schmidt's research has highlighted the importance of folic acid in protecting against the development of ASD, can too much of a good thing be a bad thing?

**Schmidt:** In general, folic acid supplementation has been associated with reduced risk for autism in the child, but that's not to say that taking tons of something that is protective at normal doses is a good idea. There was a study that found very low levels was associated with increased risk for autism, but when they looked at the higher end, with very high levels of folate and B12 in a mom's serum at birth, they saw that there was an increased risk for autism in the child.

The Institute of Medicine recommends consuming 600 micrograms per day before and during pregnancy, and similarly, the American College of Obstetrics and Gynecology recommends taking a prenatal vitamin supplement for pregnancy. And so I think that's a good idea for most mothers, but there's no reason to go far above that in terms of their folic acid intake.

**Narrator:** Dr. Schmidt stresses that following the recommendations for folic acid early on is important to help protect neurological development, particularly among certain populations. While more research is needed to understand environmental contributions to autism, she suggests that pregnant women take precautions to limit their exposure to harmful pollutants, such as pesticides or air pollution, when possible.

You can learn more about autism spectrum disorders and Dr. Schmidt's research by visiting our Environmental Health Chat web page, where you can access related materials and publications.

Thanks to today's guest, Dr. Rebecca Schmidt for joining us.

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