

Can chemicals produced by gut microbiota affect children with autism?

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Children with autism spectrum disorders (ASD) have significantly different concentrations of certain bacterial-produced chemicals, called metabolites, in their feces compared to children without ASD. This research, presented at the annual meeting of the American Society for Microbiology, provides further evidence that bacteria in the gut may be linked to autism.

"Most [gut bacteria](#) are beneficial, aiding food digestion, producing vitamins, and protecting against [harmful bacteria](#). If left unchecked, however, harmful bacteria can excrete dangerous [metabolites](#) or disturb a balance in metabolites that can affect the gut and the rest of the body, including the brain," says Dae-Wook Kang of the Biodesign Institute of Arizona State University, an author on the study.

Increasing evidence suggests that [children](#) with ASD have altered gut bacteria. In order to identify possible microbial metabolites associated with ASD Kang and his colleagues looked for and compared the compounds in fecal samples from children with and without ASD. They found that children with ASD had significantly different concentrations of seven of the 50 compounds they identified.

"Most of the seven metabolites could play a role in the brain, working as neurotransmitters or controlling neurotransmitter biosynthesis," says Kang. "We suspect that [gut microbes](#) may alter levels of neurotransmitter-related metabolites affecting gut-to-brain communication and/or altering brain function."

Children with ASD had significantly lower levels of the metabolites homovanillate and N,N-dimethylglycine. Homovanillate is the breakdown product of dopamine (a major neurotransmitter), indicating an imbalance in dopamine catabolism (the breaking down in living organisms of more complex substances into simpler ones with the release of energy). N,N-dimethylglycine is a building block for proteins and neurotransmitters, and has been used to reduce symptoms of ASD and epileptic seizures.

The glutamine/glutamate ratio was significantly higher in children with ASD. Glutamine and glutamate are further metabolized to gamma-aminobutyric acid (GABA), an inhibitory neurotransmitter. An imbalance between glutamate and GABA transmission has been associated with ASD-like behaviors such as hyper-excitation.

Using next-generation sequencing technology, the researchers also were able to detect hundreds of unique bacterial species and confirmed that children with ASD harbored distinct and less diverse gut bacterial composition.

"Correlations between gut bacteria and neurotransmitter-related metabolites are stepping stones for a better understanding of the crosstalk between gut bacteria and autism, which may provide potential targets for diagnosis or treatment of neurological symptoms in children with ASD," says Kang.

Provided by American Society for Microbiology

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