

# 1. Effect of a vitamin/mineral supplement on children and adults with autism.

[Adams JB](#), [Audhya T](#), [McDonough-Means S](#), [Rubin RA](#), [Quig D](#), [Geis E](#), [Gehn E](#), [Loresto M](#), [Mitchell J](#), [Atwood S](#), [Barnhouse S](#), [Lee W](#).

## Source

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## Abstract

### BACKGROUND:

Vitamin/mineral supplements are among the most commonly used treatments for autism, but the research on their use for treating autism has been limited.

### METHOD:

This study is a randomized, double-blind, placebo-controlled three month vitamin/mineral treatment study. The study involved 141 children and adults with autism, and pre and post symptoms of autism were assessed. None of the participants had taken a vitamin/mineral supplement in the two months prior to the start of the study. For a subset of the participants (53 children ages 5-16) pre and post measurements of nutritional and metabolic status were also conducted.

### RESULTS:

The vitamin/mineral supplement was generally well-tolerated, and individually titrated to optimum benefit. Levels of many vitamins, minerals, and biomarkers improved/increased showing good compliance and absorption. Statistically significant improvements in metabolic status were many including: total sulfate (+17%,  $p = 0.001$ ), S-adenosylmethionine (SAM; +6%,  $p = 0.003$ ), reduced glutathione (+17%,  $p = 0.0008$ ), ratio of oxidized glutathione to reduced glutathione (GSSG:GSH; -27%,  $p = 0.002$ ), nitrotyrosine (-29%,  $p = 0.004$ ), ATP (+25%,  $p = 0.000001$ ), NADH (+28%,  $p = 0.0002$ ), and NADPH (+30%,  $p = 0.001$ ). Most of these metabolic biomarkers improved to normal or near-normal levels. The supplement group had significantly greater improvements than the placebo group on the Parental Global Impressions-Revised (PGI-R, Average Change,  $p = 0.008$ ), and on the subscores for Hyperactivity ( $p = 0.003$ ), Tantrumming ( $p = 0.009$ ), Overall ( $p = 0.02$ ), and Receptive Language ( $p = 0.03$ ). For the other three assessment tools the difference between treatment group and placebo group was not statistically significant. Regression analysis revealed that the degree of improvement on the Average Change of the PGI-R was strongly associated with several biomarkers (adj.  $R^2 = 0.61$ ,  $p < 0.0005$ ) with the initial levels of biotin and vitamin K being the most significant ( $p < 0.05$ ); both biotin and vitamin K are made by beneficial intestinal flora.

### CONCLUSIONS:

Oral vitamin/mineral supplementation is beneficial in improving the nutritional and metabolic status of children with autism, including improvements in methylation, glutathione, oxidative stress, sulfation, ATP, NADH, and NADPH. The supplement group had significantly greater improvements than did the placebo group on the PGI-R Average Change. This suggests that a vitamin/mineral supplement is a reasonable adjunct therapy to consider for most children and adults with autism.

link to full article - <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3266205/>

[J Altern Complement Med](#). 2004 Dec;10(6):1033-9.

## Pilot study of a moderate dose multivitamin/mineral supplement for children with autistic spectrum disorder.

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## Source

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### Abstract

#### OBJECTIVE:

Determine the effect of a moderate dose multivitamin/mineral supplement on children with autistic spectrum disorder.

#### DESIGN:

Randomized, double-blind, placebo-controlled 3-month study.

#### SUBJECTS:

Twenty (20) children with autistic spectrum disorder, ages 3-8 years.

#### RESULTS:

A Global Impressions parental questionnaire found that the supplement group reported statistically significant improvements in sleep and gastrointestinal problems compared to the placebo group. An evaluation of vitamin B(6) levels prior to the study found that the autistic children had substantially elevated levels of B6 compared to a control group of typical children (75% higher,  $p < 0.0000001$ ). Vitamin C levels were measured at the end of the study, and the placebo group had levels that were significantly below average for typical children, whereas the supplement group had near-average levels.

#### DISCUSSION:

The finding of high vitamin B(6) levels is consistent with recent reports of low levels of pyridoxal-5-phosphate and low activity of pyridoxal kinase (i.e., pyridoxal is only poorly converted to pyridoxal-5-phosphate, the enzymatically active form). This may explain the functional need for high-dose vitamin B(6) supplementation in many children and adults with autism.

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