

# Abstract

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## Autism and vitamin D.

Cannell JJ.

Atascadero State Hospital, Psychiatry, 10333 El Camino Real, Atascadero, CA 93423, United States.

**BACKGROUND:** Any theory of autism's etiology must take into account its strong genetic basis while explaining its striking epidemiology. The apparent increase in the prevalence of autism over the last 20 years corresponds with increasing medical advice to avoid the sun, advice that has probably lowered vitamin D levels and would theoretically greatly lower activated vitamin D (calcitriol) levels in developing brains.

**DISCUSSION:** Animal data has repeatedly shown that severe vitamin D deficiency during gestation dysregulates dozens of proteins involved in brain development and leads to rat pups with increased brain size and enlarged ventricles, abnormalities similar to those found in autistic children. Children with the Williams Syndrome, who can have greatly elevated calcitriol levels in early infancy, usually have phenotypes that are the opposite of autism. Children with vitamin D deficient rickets have several autistic markers that apparently disappear with high-dose vitamin D treatment. Estrogen and testosterone have very different effects on calcitriol's metabolism, differences that may explain the striking male/female sex ratios in autism. Calcitriol down-regulates production of inflammatory cytokines in the brain, cytokines that have been associated with autism. Consumption of vitamin D containing fish during pregnancy reduces autistic symptoms in offspring. Autism is more common in areas of impaired UVB penetration such as poleward latitudes, urban areas, areas with high air pollution, and areas of high precipitation. Autism is more common in dark-skinned persons and severe maternal vitamin D deficiency is exceptionally common the dark-skinned.

**CONCLUSION:** Simple Gaussian distributions of the enzyme that activates neural calcitriol combined with widespread gestational and/or early childhood vitamin D deficiency may explain both the genetics and epidemiology of autism. If so, much of the disease is iatrogenic, brought on by medical advice to avoid the sun. Several types of studies could easily test the theory.

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