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Glucosamine-like supplement may suppress MS: Study

By Nathan Gray, Contact the editor, 03-Oct-2011

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The glucosamine-like dietary supplement N-acetylglucosamine may suppresses the autoimmune response of multiple sclerosis, according to new research.

The study, published in *The Journal of Biological Chemistry*, reports that oral N-acetylglucosamine (GlcNAc) – an essential sugar that is similar to glucosamine – suppressed the growth and functions of abnormal immune cells that incorrectly direct the immune system to attack and break down central nervous system tissue in multiple sclerosis (MS).



The researchers, led by Dr. Michael Demetriou from University of California, Irvine, USA, said that the research suggests that oral GlcNAc may provide “an inexpensive and non-toxic oral therapeutic agent for MS that directly targets an underlying molecular mechanism causal of disease.”

“This sugar-based supplement corrects a genetic defect that induces cells to attack the body in MS ... making metabolic therapy a rational approach that differs significantly from currently available treatments,” said Demetriou, who is associate director of UCI's Multiple Sclerosis Research Center.

“Excitement about this strategy stems from the novel mechanism for affecting T-cell function and autoimmunity – the targeting of a molecular defect promoting disease – and its availability and simplicity,” he added.

MS therapy

Demetriou and his colleagues said that the current treatments and emerging oral therapies for MS are often limited by effectiveness, cost, and toxicity. However, earlier this year his team discovered that environmental and inherited risk factors associated with MS – which were previously poorly understood and not known to be connected – come together to affect how specific sugars are added to proteins regulating the disease.

They reported that both genetic and environmental factors alter the branching of certain sugar molecules, which in turn results in immune T cell hyperactivity – promoting “spontaneous inflammatory demyelination and neurodegeneration.”

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The researchers explained that virtually all proteins on the surface of cells, including immune cells such as T-cells, are modified by complex sugar molecules of variable sizes and composition. They said that studies recent studies have linked changes in these sugars to T-cell hyperactivity and autoimmune diseases such as MS.

Study details

In a mouse model of MS, Demetriou and his team found that GlcNAc given orally to those with leg weakness suppressed T-cell hyperactivity and autoimmune response by increasing sugar modifications to the T-cell proteins, thereby reversing the progression to paralysis.

"We provide data indicating that oral administration of the simple sugar GlcNAc enhances N-glycan branching while inhibiting CD25+ cells, Th1 and Th17 cytokines and disease progression ... when initiated after disease onset," said the researchers.

They added that the result is consistent with earlier *in vitro* studies of GlcNAc, which found it to reduce signalling, growth, and differentiation of T cells known to play a role in MS.

However Demetriou warned that more human studies are required to assess the full potential of the approach.

"If proven effective, it would provide the first therapy that directly targets an underlying genetic mechanism promoting disease," he added.

Source: *The Journal of Biological Chemistry*

Published online ahead of print, doi:

[10.1074/jbc.M111.277814](https://doi.org/10.1074/jbc.M111.277814)

"N-acetylglucosamine inhibits T-helper 1 (Th1) / T-helper 17 (Th17) responses and treats experimental autoimmune encephalomyelitis"

Authors: A. Grigorian, L. Araujo, N.N. Naidu, D. Place, B. Choudhury, M. Demetriou

Keywords: N-acetylglucosamine, multiple sclerosis, MS, glucosamine

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