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Vitamin D supplements may yield immune benefits in healthy people: Study



By Nathan Gray+
26-Mar-2013

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Improving levels of vitamin D in the blood via supplementation could help to fight of disease by affecting gene expression and boosting the immune system, say researchers.

The study, published online in *PLoS ONE*, reveals for the first time that improvement in the vitamin D status of healthy adults significantly impacts genes involved with a number of biologic pathways associated with cancer, cardiovascular disease (CVD), infectious diseases and autoimmune diseases.

Led by researchers from Boston University School of Medicine (BUSM), USA, the new findings – from a randomised, double-blind pilot trial - go a step further than previous research that has suggested vitamin D may be associated with increased risks of ill health by providing direct evidence that improvement in vitamin D status plays a role in improving immune responses and lowering the risk for many diseases.

"This study reveals the molecular fingerprints that help explain the non-skeletal health benefits of vitamin D," said Professor Michael Holick, a leading vitamin D expert from BUSM, and corresponding author of the new study.

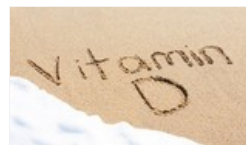
"While a larger study is necessary to confirm our observations, the data demonstrates that improving vitamin D status can have a dramatic effect on gene expression in our immune cells and may help explain the role of vitamin D in reducing the risk for CVD, cancer and other diseases," he said.

The sunshine vitamin

Vitamin D refers to two biologically inactive precursors - D3, also known as cholecalciferol, and D2, also known as ergocalciferol.

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Both D3 and D2 precursors are transformed in the liver and kidneys into 25-hydroxyvitamin D (25(OH)D), the non-active 'storage' form, and 1,25-dihydroxyvitamin D (1,25(OH)2D), the biologically active form that is tightly controlled by the body.

Vitamin D is unique in that it can be both ingested and synthesized by the body with sun exposure. It is then converted by both the liver and kidneys to a form that the body can use.

An individual's vitamin D status is determined by measuring the level of 25-hydroxyvitamin D in the blood.

Vitamin D deficiency, which is defined as a status of less than 20 nanograms per milliliter (ng/mL) of 25-hydroxyvitamin D, can cause a number of health issues, including rickets and other musculoskeletal diseases.

Recently, however, data suggests that vitamin D deficiency (<20 ng/mL) and vitamin D insufficiency (between 21-29 ng/mL) may be linked to cancer, autoimmune diseases, infectious diseases, type 2 diabetes and cardiovascular disease.

Research details

The randomised, double-blind, single-site pilot trial involved eight healthy men and women with an average age of 27, all of whom were vitamin D deficient or insufficient at the start of the trial.

Three participants received 400 International Units (IUs) of vitamin D per day and five received 2,000 IUs per day for a two-month period. Samples of immune cells were collected at the beginning of the two-month period and again at the end.

In addition, a broad gene expression analysis was conducted on the samples – with more than 22,500 genes investigated to see if their activity increased or decreased as a result of the vitamin D intake.

Holick and his team found that the group receiving 2000 IUs achieved a vitamin D status of 34 ng/mL (considered sufficient) while the group that received 400 IUs achieved an insufficient status of 25 ng/mL.

Gene expression analysis results also indicated statistically significant alterations in the activity of 291 genes, they said. Further analysis showed that the biologic functions associated with the 291 genes are related to 160 biologic pathways linked to cancer, autoimmune diseases, infectious diseases and CVD.

Source: *PLoS ONE*

Published online ahead of print, doi: [10.1371/journal.pone.0058725](https://doi.org/10.1371/journal.pone.0058725)

"Influence of Vitamin D Status and Vitamin D3 Supplementation on Genome Wide Expression of White Blood Cells: A Randomized Double-Blind Clinical Trial"

Authors: Arash Hossein-nezhad, Avrum Spira, Michael F. Holick

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