

Genetic variant increasing vitamin D metabolism improves blood sugar control with high protein weight loss diet

September 29 2015

New research published in *Diabetologia* shows that people carrying a certain genetic variant relating to vitamin D metabolism are more likely to benefit from a high-protein weight loss diet than those without it. The research is by Dr Qibin Qi, Albert Einstein College of Medicine and Montefiore Health System, Bronx, NY, USA and Dr Yan Zheng, Harvard T.H. Chan School of Public Health, Boston, MA, USA, and Dr Lu Qi, Tulane University School of Public Health and Tropical Medicine, New Orleans, LA, USA and Harvard T.H. Chan School of Public Health, Boston, MA, USA and colleagues.

Previous research has shown that low levels of circulating vitamin D are associated with obesity, [insulin resistance](#) and an increased risk of type 2 diabetes. Other genetic studies have identified several genes involved in vitamin D metabolism. In this new research, the authors analysed whether diets high in fat or protein—both good sources of vitamin D—interact with these genetic variants in a way that improves [weight loss](#) and metabolic outcomes such as blood sugar control. They analysed interactions with three gene variants:

1. DHCR7: involved in the synthesis of cholesterol, which is itself an essential component for making vitamin D
2. CYP2R1: this converts vitamin D into 25-hydroxyvitamin D, which is the major circulatory form of vitamin D
3. GC: vital for vitamin D storage and transport

The authors analysed overweight/obese participants from a 2 year weight-loss trial conducted in the USA (the POUNDS Lost study). They assessed genotype effects on changes in body weight, fasting levels of glucose and insulin, and insulin resistance at both 6 months (656 participants) and 2 years (596 participants) in response to low-protein versus high-protein diets, and low-fat versus high-fat diets.

They found significant interactions between DHCR7 and diets varying in protein, but not in fat, which brought about changes in insulin and insulin resistance at both 6 months and 2 years. People with the DHCR7 variant which leads to increased vitamin D showed greater decreases in fasting insulin levels and insulin resistance in response to high-protein diets, while there was no significant genotype effect on changes in these traits in the low-protein diet group. There was no significant interaction found between the other two genetic variants and dietary protein, or any of the three variants with dietary fat.

Regarding weight loss, there was no significant interaction between vitamin D genetic variants and dietary protein or fat on weight loss. The amount of weight loss was similar between the low- and high-protein diet groups, and between the low- and high-fat diet groups (meaning all the diets worked for weight loss, but there were no differences between people with different genotypes).

The authors say: "We speculate that vitamin D and/or other nutrients from protein-rich foods may interact with DHCR7 to influence DHCR7 function, thereby affecting blood vitamin D levels and eventually modifying the effects on changes in insulin resistance...Our findings provide new insight into the utility of using knowledge of vitamin-D-related [genetic variation](#) to improve personalised dietary interventions."

"Our findings of gene-protein dietary interaction are biologically plausible, provide additional evidence for the roles of vitamin D in

insulin resistance, and suggest new insights into effective strategies for type 2 diabetes prevention and intervention."

More information: *Diabetologia*, [link.springer.com/article/10.1...
07/s00125-015-3750-1](https://link.springer.com/article/10.1007/s00125-015-3750-1)

Provided by Diabetologia

Citation: Genetic variant increasing vitamin D metabolism improves blood sugar control with high protein weight loss diet (2015, September 29) retrieved 7 May 2024 from <https://medicalxpress.com/news/2015-09-people-genetic-variant-vitamin-d.html>

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