

## Lowering Inflammation Through Diet, Exercise, and Vitamin D

July 10, 2015

Obesity places the body into a state of chronic inflammation. Find out how weight loss, when combined with a Vitamin D supplement, lowered pro-inflammatory proteins in the body.

By [Thomas G. Ciccone](#) [1] and [Forest Tennant, MD, DrPH](#) [2]

*Commentary by Catherine Duggan, PhD*

Inflammation appears to be the culprit linking obesity and cancer.<sup>1-3</sup> Obesity dysregulates inflammation, flooding the body with inflammatory proteins, or cytokines. Because of this, people who are obese or overweight could be in a state of [chronic inflammation](#) [3]. Interleukin-6, or IL-6, is one such cytokine that spikes in the system, becoming pro-tumorigenic.

Consequently, when patients lose weight, their biomarkers for inflammation also lower. Now researchers may have found a more effective way to lose weight and reduce inflammation—combine vitamin D with diet and exercise.



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[4]When women on a diet and exercise program took a vitamin D3 supplement every day, their IL-6 levels dropped more than twice as much as those on a diet and exercise program alone, reported researchers at Fred Hutchinson Cancer Research Center.<sup>4</sup>

**"IL-6 is really a key player in the inflammatory response. It's vital in just normal bodily functions, especially the immune response to infection,"** said lead author Catherine Duggan, PhD, a senior staff scientist at the Fred Hutchinson Cancer Research Center in Seattle, Washington.

**"But the problem is when it's elevated, as in autoimmune diseases like rheumatism or arthritis, it's actually a causative effect in the etiology of cardiovascular disease or cancer."**

Vitamin D becomes vital, she noted, as it can inhibit the production of IL-6 through downregulation of cyclooxygenase (COX)-2 tissue expression. Obese people can [lack vitamin D](#) [5], though, possibly

because the excessive fat sequesters it out of the body's circulation, leading to deficiency," Dr. Duggan said.

Clinical research has heralded the benefits of vitamin D for preventing type 1 diabetes,<sup>5</sup> promoting survival from certain cancers,<sup>6</sup> and decreasing the risks of coronary heart disease.<sup>7</sup> Overlooked, however, has been the traditional role of [vitamin D in promoting musculoskeletal health](#) [6] and the considerable evidence demonstrating advantages of vitamin D therapy in helping to alleviate chronic muscle, bone and joint aches, and pains of various types.

## Diet and Exercise

Over the course of 12 months, 218 women (postmenopausal, mean BMI 32.4 kg/m<sup>2</sup>, aged average 59.6 years) enrolled in the vitamin D (ViDA) lifestyle-based diet and exercise program, with a goal of at least 10% loss of baseline weight. The women were split into two groups: 109 women took an oral supplement of 2,000 IU/day of vitamin D (cholecalciferol or vitamin D3), and 109 women who took a placebo.

After a year, all the women had a noticeable drop in IL-6. However, the women in the active treatment group showed the best results. These women lost at least 5% to 10% of their baseline weight and dropped more than a third off their IL-6 levels (37.3%), while the control group's IL-6 level only dropped by 17.2%. According to Dr. Duggan, this evidence presents a promising intervention for managing inflammation in obesity.

"Unfortunately with autoimmune disease, [inflammation] is a much a harder issue to deal with, but obesity is something people can actually do something about. That's sort of our hope, and for people who are overweight with autoimmune diseases, that's something that can also be a method of managing their state."

However, other pro-inflammatory cytokines, like tumor necrosis factor (TNF)- $\alpha$ , IL-1 $\beta$ , and IL-8, didn't seem to change after weight loss and Vitamin D supplementation. Dr. Duggan and her colleagues looked at other markers, as well, like the anti-inflammatory IL-10, the glucose-regulating adiponectin, and leptin, but they couldn't find any meaningful differences there, either.

One possible explanation is the patients weren't in dire need of Vitamin D supplementation, so adding it wouldn't have noticeably changed their analytes, anyway. In fact, the women's average baseline serum 25(OH) D level was at 21.4(SD6.1) ng/mL, while actual "deficiency" cut-offs are typically at  $\leq 10$  ng/mL or  $\leq 20$  ng/mL.<sup>8-10</sup>

## Vitamin D Deficiency

If the women were vitamin D deficient, could there have been different results?

"Yes, I think we would have seen a stronger effect, but unfortunately since there are serious health effects associated with being deficient, instead of insufficient, ethically we couldn't recruit those women into the study. When they came back with the  $<20$  ng/mL cutoff, we advised them to speak to their doctor about supplementation, so that's why we didn't include them," Dr. Duggan said.

Regardless, the study provides further evidence of the immense health benefits of losing weight, and Dr. Duggan recommended that, in addition to losing excess weight, people should get their vitamin D levels checked, especially if they have chronic pain.

In the future, Dr. Duggan said she would like to see a study that compared patients put in 3 groups: losing weight, losing weight while taking vitamin D, and not losing weight while taking vitamin D. This could help clarify the effect vitamin D appears to have, she said. Also, since the majority of the study

group was non-Hispanic white (86.2%), Dr. Duggan said she would like to test other racial and ethnic groups.

*The study was supported by the Breast Cancer Research Foundation 2013-2014, Susan G. Komen for the Cure Scientific Advisory Council Award 2010-2012, National Institutes of Health, Seattle Cancer Consortium Breast Cancer SPORE, Fred Hutchinson/University of Washington Cancer Consortium, and the Safeway Foundation. The authors declared no potential conflicts of interest.*

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