

THE VITAMIN D NEWSLETTER

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The Vitamin D Council

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Obesity and Vitamin D

One third of Americans are obese. While much of that epidemic is surely due to playing Nintendo instead of baseball, or the consumption of soft drinks instead of water, does that explain it all? Is it a coincidence that the twin epidemics of obesity and vitamin D deficiency are occurring together?

Take this short quiz to test your knowledge of the scientific literature concerning vitamin D and obesity. Remember, alternative explanations exist for all of these findings. However, in the end, the answer is really quite simple.

1. Which of the following is true?
 - A. Weight increases with higher latitude,
 - B. Weight increases with lower altitude,
 - C. Weight increases in the winter,
 - D. All of the above

D, all of the above are true. While the seasonal variation in weight is well known, the variations with latitude and altitude are less well known. Different explanations exist for all three associations but vitamin D provides a parsimonious explanation as vitamin D decreases with higher latitude, lower altitude and with the winter.

[Ann Hum Biol. 1988 Sep-Oct;15\(5\):353-64.](#)

2. When aboriginal populations migrate from high altitude to low altitude, without significantly changing their diet, body fat increases.

- A. True.
- B. False.

True. As vitamin D production is less at lower altitude, a vitamin D theory of obesity would predict such a change.

[High Alt Med Biol. 2004 Spring;5\(1\):27-31.](#)

3. Studies show that populations whose religious customs dictate that the skin be covered, such as Arabs, do not show variations in weight based on altitude. Populations that do not cover the skin, such as central Asians, show variations in weight based on altitude.

- A. True
- B. False

True. Saudi Arabians, who often cover their skin and make little vitamin D, show no associations between altitude and weight, while central Asians, who do not cover their skin, are leaner at higher altitudes where more vitamin D would be made in the skin.

[Ann Hum Biol. 1995 Sep-Oct;22\(5\):459-65.](#)

[Ann Hum Biol. 2000 Jan-Feb;27\(1\):19-28.](#)

4. Current scientific literature makes it likely that vitamin D reduces weight.

- A. True
- B. False

True. Higher calcium intake is consistently associated with lower body weight, a topic recently reviewed by Heaney. As vitamin D significantly increases calcium absorption, it seems likely that higher intakes of vitamin D would decrease body weight, even if the vitamin itself had no direct effect on weight.

[J Am Coll Nutr. 2002 Apr;21\(2\):152S-155S.](#)

5. Vitamin D and calcium, when taken together, suppress spontaneous food intake and burn fat.

- A. True.
- B. False

True. This month, two human feeding studies using calcium (543 mg) and vitamin D (349 units) indicated that the combination of both reduced subsequent spontaneous food intake and increased the metabolism of fat.

[Asia Pac J Clin Nutr. 2004;13\(Suppl\):S82.](#)

[Asia Pac J Clin Nutr. 2004;13\(Suppl\):S56.](#)

6. Genetic abnormalities of the vitamin D receptor (called VDR polymorphisms) are associated with body weight and fat mass.

- A. True
- B. False

True. Patients with VDR polymorphisms have reduced vitamin D activity at their receptors and usually show an increased incidence of vitamin D related diseases. Although VDR polymorphism studies are often contradictory, they tend to show associations with body weight.
[Eur J Endocrinol. 2004 Mar;150\(3\):323-8.](#)
[Calcif Tissue Int. 1995 Aug;57\(2\):161-2.](#)
[Eur J Endocrinol. 2001 Apr;144\(4\):385-9.](#)

7. Blood parathyroid levels, which are elevated in vitamin D deficiency, predict obesity.

- A. True
- B. False

True. Vitamin D deficiency is associated with elevated parathyroid hormone levels. If vitamin D deficiency caused obesity, than obese patients should have elevated blood parathyroid hormone levels. In fact, the association between obesity and elevated parathormone levels is well known.
[Eur J Endocrinol. 2004 Aug;151\(2\):167-72.](#)

8. Scientists have found that vitamin D blood levels are lower in obese subjects than in thin subjects.

- A. True.
- B. False.

To my knowledge, only two studies examined actual vitamin D levels in obese subjects and one found dramatically lower levels in obese subjects. A South Carolina study found all of the obese subjects had levels below 2.2 ng/ml while all of the nonobese subjects had levels above 8 ng/ml. (These are vitamin D levels, not 25(OH)D levels.)
[Calcif Tissue Int. 1988 Oct;43\(4\):199-201.](#)

9. If vitamin D deficiency explains some cases of obesity, then studies have consistently shown that 25(OH)D levels are lower in obese subjects.

- A. True.
- B. False.

True. Starting in 1981, at least ten studies have shown exactly that, some of which are listed

below. Some studies have also shown a linear association, that is, the higher your 25(OH)D levels, the less you weigh. Not only weight, but percentage of body fat, increases as 25(OH)D levels fall.

[Am J Clin Nutr. 1981 Nov;34\(11\):2359-63.](#)

[J Clin Invest. 1985 Jul;76\(1\):370-3.](#)

[Obes Surg. 1993 Nov;3\(4\):421-424.](#)

[J Clin Endocrinol Metab. 2003 Jan;88\(1\):157-61.](#)

10. Obese subjects obtain lower 25(OH)D levels when exposed to ultraviolet light or when they take supplemental vitamin D.

- A. True.
- B. False.

True. Obese subjects appear to deposit some their vitamin D in their excessive fatty tissue, thus impairing their ability to raise their 25(OH)D levels.

[Am J Clin Nutr. 2000 Sep;72\(3\):690-3.](#)

11. The theory that vitamin D deficiency contributes to some cases of obesity, would mean that obesity is linked with other diseases associated with vitamin D deficiency, such as cancer, diabetes and heart disease.

- A. True.
- B. False.

True. Obesity and vitamin D deficiency are comorbid with numerous diseases such as heart disease, hypertension, diabetes, osteoarthritis, osteoporosis, depression and even periodontal disease. This is consistent with the theory that vitamin D deficiency plays a role in obesity.

[J Clin Endocrinol Metab. 2004 Jun;89\(6\):2583-9.](#)

[Can J Public Health. 2004 May-Jun;95\(3\):179-83.](#)

[J Periodontol. 2003 May;74\(5\):610-5.](#)

12. As obesity is associated with early death, and low vitamin D levels are more likely in the winter, then you are more likely to die in the winter.

- A. True
- B. False

True. Scientists have known about and debated the cause of excess winter deaths for years.

[Int J Epidemiol. 2001 Oct;30\(5\):1109-16.](#)

13. If vitamin D deficiency is one of the treatable causes of obesity, then a study has shown that the more vitamin D in your diet, the less you weigh.

- A. True.
- B. False.

True. Last year, a Norwegian group reported just that. The authors concluded, “placebo-controlled intervention studies with calcium and vitamin D, in which the primary end point is weight change, are warranted.”

[J Nutr. 2003 Jan;133\(1\):102-6.](#)

Conclusions:

Will taking vitamin D cause you to lose weight? No one knows. Is it a coincidence that the twin epidemics of obesity and vitamin D deficiency are occurring together? Alternative explanations exist for all the above findings. A vitamin D feeding study designed to answer that specific question is needed, using physiological doses of vitamin D (5,000 units) or, alternatively, enough vitamin D to raise 25(OH)D levels into the high normal range. In addition, both the study group and one of the control arms needs to get adequate supplemental calcium, at least 1500 mg/day, to assure calcium cannot explain any findings.

In the meantime, what should you do? If you are overweight, make certain you are not vitamin D deficient. And if you are slim, make certain you are not vitamin D deficient. It is really quite simple.

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