

Vitamin D Absorption, Part 1

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Vitamin D research has exploded in the past few years. The number of conditions that low or deficient levels of vitamin D can cause and/or exacerbate continues to expand. (See table below.) In the course of this research, focus has included the different types of vitamin D. Vitamin D comes in five forms - D₁, D₂, D₃, D₄ and D₅. Of these, vitamin D₂ (ergocalciferol) and vitamin D₃ (cholecalciferol) are bioactive and used in supplements. A simplified summary of the difference is as follows:

- Vitamin D₂ is synthesized by UV irradiation of chemical derivatives from yeast.
- Vitamin D₃ is synthesized by UV irradiation of chemical derivatives from lanolin.

Health Conditions Associated With Low Vitamin D Status (below 30 ng/mL) ¹⁻³
Osteoporosis
Rickets
Psoriasis
Muscle pain
Cognitive impairment
Cardiovascular disease
Childhood asthma
Multiple sclerosis
Hypertension
Glucose intolerance
Type 1 diabetes
Type 2 diabetes
Seasonal affective disorder
Falls (imbalance in seniors)
Periodontal disease
Senile warts
Premature births
Gestational immunity

Both vitamin D₂ and vitamin D₃ are used in over-the-counter supplements, but only vitamin D₂ is available in pharmacologic preparations. This is because vitamin D₂ was developed in the early 1930s and was grandfathered in as a controlled substance when the FDA (as we know it) was formed in 1938. Vitamin D₃ was developed in the 1950s. Historically, they were considered equal based on the [responses of patients with rickets](#).⁴ This opinion has changed after a number of studies have shown vitamin D₃ to be superior to vitamin D₂. This is based on measuring serum 25-hydroxyvitamin D [25(OH)D], which is the gold standard for determining vitamin D status in humans. Researchers believe vitamin D-binding proteins in the plasma prefer vitamin D₃ over D₂.

Among the most commonly cited studies is a two-week study in which 17 subjects were given 4,000 IU vitamin D₂ daily and 55 subjects were given 4,000 IU of vitamin D₃ daily. [Serum levels of](#)

25(OH)D were 1.7 times higher with D₃ supplementation.⁵ Another commonly cited study, this one a single-dose study, divided 30 people into three groups: 10 individuals took placebo, 10 were given 50,000 IU of vitamin D₂ and 10 took 50,000 IU of vitamin D₃. Serum 25(OH)D measurements were performed over 28 days. Both forms of vitamin D showed equal elevations four days after the megadose.

By day seven, 25(OH)D levels in the D₂ subjects began to drop, reaching baseline on day 16 and ending with lower levels than the placebo group and less than they had before the study. 25(OH)D levels in the vitamin D₃ group continued to rise and peaked on day 14. On day 28, 25(OH)D remained elevated above baseline in the D₃ group.⁶ The results of these studies and others were summarized in a paper that concluded vitamin D₃ was clearly superior to vitamin D₂ based on its absorption.⁷

In part 2 of this article (Jan. 15, 2010 issue), I will review a study that showed vitamin D₂ may be better than we think.

References

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