

Health Benefits of Correcting Vitamin D Deficiency

The 2024 Endocrine Society Clinical Practice Guideline provides the most current framework for who benefits from vitamin D optimization. The evidence is strongest in the following areas:

Respiratory Infections — An individual participant data meta-analysis of 25 RCTs (n = 10,933) found vitamin D supplementation reduced acute respiratory infections overall (aOR **0.88**, 95% CI 0.81–0.96). The benefit was dramatically stronger in those with severe deficiency (25(OH)D < 25 nmol/L): aOR **0.30** (95% CI 0.17–0.53), representing a **70% risk reduction**. Daily or weekly dosing was effective, while intermittent bolus dosing was not. However, a 2025 updated meta-analysis of 46 RCTs (n = 64,086) found the overall protective effect was no longer statistically significant (OR 0.94, 95% CI 0.88–1.00), suggesting earlier estimates may have been inflated.

Cancer Mortality — While vitamin D does not reduce cancer incidence, multiple RCTs and meta-analyses consistently show a reduction in **cancer mortality**. A systematic review of 107 RCTs found suggestive evidence for benefit specifically on cancer death rates. A separate meta-analysis confirmed that 10–20 µg/day of vitamin D can reduce both all-cause and cancer mortality in middle-aged and older adults.

Type 2 Diabetes Prevention — In adults with prediabetes, moderate-certainty evidence from the D2d trial and meta-analyses suggests vitamin D supplementation reduces progression to type 2 diabetes.

Autoimmune Disease — The VITAL trial's ancillary autoimmune study found vitamin D 2,000 IU/day reduced the incidence of autoimmune disease by **22%** over 5 years. An international consensus statement supports vitamin D optimization for immune tolerance, particularly in documented deficiency.

Bone Health — Vitamin D at **700–800 IU/day reduces hip fractures by ~25%** in older adults, while 400 IU/day shows no benefit — a clear dose-response relationship. However, this benefit is primarily demonstrated in institutionalized or vitamin D-deficient elderly, not community-dwelling adults with adequate levels.

All-Cause Mortality — A systematic review supporting the Endocrine Society guideline found a very small but statistically significant reduction in mortality among adults older than 75 years with **high certainty of evidence**.

****Key Caveats and Nuance**

The critical distinction in the vitamin D literature is between **deficient and replete populations**. The large VITAL (n = 25,871), ViDA, and D2d trials showed that supplementing vitamin D-replete adults (baseline 25(OH)D > 50 nmol/L) does **not** prevent cancer, cardiovascular events, falls, or diabetes progression. The Endocrine Society guideline explicitly recommends **against** routine supplementation beyond the RDA in healthy adults aged 19–74 years, reserving targeted supplementation for high-risk groups.

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