

Spotlight on Health

Vitamin D Beyond Bone Health

Vitamin D deficiency is well known as the cause of bone diseases such as rickets, osteoporosis, and osteomalacia. However, in epidemiological studies, vitamin D deficiency has also been linked to nonskeletal illnesses. The ones most commonly cited are cardiovascular disease (CVD), cancer (especially colorectal and breast), and certain infectious and autoimmune diseases.

Cardiovascular Disease

The potential link between vitamin D and CVD may have a biologic basis. For example, vitamin D receptors and related metabolic enzymes are found in blood vessels and tissues of the heart. Vitamin D may reduce platelet cell adhesion, suppress inflammation, and decrease renin gene expression, leading to less vasoconstriction.¹⁻⁴

Most of the literature exploring a link between vitamin D and CVD consists of observational studies. Some, but not all, of these studies show an association between decreased 25(OH)D concentration and a higher incidence of CVD surrogate markers and risk factors.¹⁻⁴ Observational studies have also shown similar data regarding CVD events.^{1,2,4} However, there are no clinical trials that show raising vitamin D levels to the therapeutic range reduces the risk of CVD.

Cancer

The story is similar for cancer. Epidemiologic data show that higher levels of vitamin D are associated with a lower incidence of cancer. For example, McDonnell et al reported that concentrations ≥ 40 ng/mL are associated with a >65% lower cancer risk in women 55 years and older. In this study, 13 types of cancer were diagnosed in women during the 4-year follow-up period. Breast cancer accounted for 43% of the cancers.⁵

Again, evidence points to a potential biologic basis. Vitamin D receptors have been found in a number of tissues, including colon, breast, prostate, and brain. The active form of vitamin D is involved in the control of more than 200 genes, including those involved in immune function and regulating cell growth and apoptosis.

As with CVD and vitamin D, it is unknown whether raising vitamin D blood levels will reduce cancer risk. Some studies do suggest, however, that having a level in the optimal range increases the chance of recovery from cancer.⁶



What the Guidelines Say

The Endocrine Society recommends screening people at high risk. These include people with⁷:

- Bone disorders
- Certain lymphomas
- Chronic kidney disease
- Dark complexions
- Granuloma-forming disorders
- Hepatic failure
- Hyperparathyroidism
- Malabsorption syndromes (cystic fibrosis, inflammatory bowel disease, bariatric surgery, radiation enteritis)
- Medications that increase vitamin D metabolism (eg, anticonvulsants, antiretrovirals, antifungals, cholestyramine, glucocorticoids)

Obese people, pregnant or lactating women, and elderly people with a history of falls or nontraumatic fracture are also at high risk for vitamin D deficiency.

The Society further recommends against screening people who are not at high risk.⁷

Infectious Diseases⁸

Vitamin D receptors are present in immune cells as well as bronchial and pulmonary epithelial cells. Thus, studies have looked for links between vitamin D and infectious diseases. These studies primarily focused on upper respiratory tract infections (RTIs) (eg, cold and influenza), pneumonia, and tuberculosis. Once again, observational studies show a link between low blood levels and elevated disease risk, but the effect of supplementation on prevention and treatment is not clear. For example, some studies show healthy children and adults have a lower risk of RTI when taking 300 to 2,000 IU/day. Others showed no benefit. Vitamin D appears to have no benefit for treating or reducing the risk of pneumonia, and adjunctive vitamin D does not appreciably alter the clearance of *Mycobacterium tuberculosis*. People with tuberculosis and initially very low vitamin D blood levels may benefit in other ways during treatment, however.

Autoimmune Diseases⁹

In epidemiological studies, low levels of vitamin D have been linked to certain autoimmune diseases. These include Crohn disease, diabetes mellitus type 1, multiple sclerosis, rheumatoid arthritis, antiphospholipid syndrome, autoimmune thyroiditis, primary biliary cirrhosis, Sjögren syndrome, and systemic lupus erythematosus.

At this time, it's uncertain whether the low levels of vitamin D are a consequence of the autoimmune disease or if they contribute to the pathogenesis. However, some data suggest supplementation may help prevent type 1 diabetes and multiple sclerosis.

Tests Offered by Quest Diagnostics

Quest Diagnostics offers an immunoassay and 2 LC/MS/MS methods, 1 for adults and children and 1 for infants. All methods are certified by the Centers for Disease Control and Prevention Vitamin D Standardization-Certification Program.

The immunoassay measures total 25-hydroxyvitamin D (25[OH]D). Results are typically available within a day; thus, results can be reported at the same time as many other “routine” tests.

The LC/MS/MS methods measure 25(OH)D₂ and 25(OH)D₃. These 2 measurements are added to calculate the total 25(OH)D concentration. All 3 values are reported. The assay for infants includes separation of 3-epimer, the low-activity form of 25(OH)D₃, to avoid overestimation of total vitamin D activity. LC/MS/MS results are typically available within 1 to 2 days (adults and children) or 2 to 3 days (infants).

References

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