

I have been a Nurse Practitioner for the past 40 years and I am sharing what I have learned about nutrition and the importance of nutrition for whole health. Today is the fifth in a series discussing Calcium and Vitamin D. We will be discussing Vitamin D and whole health. Much of the information contained in this is from the National Institute of Health.

Bone health and osteoporosis

Bone is constantly being remodeled. However, as people age—and particularly in women during menopause—bone breakdown rates overtake rates of bone building. Over time, bone density can decline, and osteoporosis can eventually develop.

More than 53 million adults in the United States have or are at risk of developing osteoporosis, which is characterized by low bone mass and structural deterioration of bone tissue that increases bone fragility and the risk of bone fractures.

About 2.3 million osteoporotic fractures occurred in the United States in 2015. Osteoporosis is, in part, a long-term effect of calcium and/or vitamin D insufficiency, in contrast to rickets and osteomalacia, which result from vitamin D deficiency.

Osteoporosis is most often associated with inadequate calcium intakes, but insufficient vitamin D intakes contribute to osteoporosis by reducing calcium absorption.

Bone health also depends on support from the surrounding muscles to assist with balance and postural sway and thereby reduce the risk of falling. Vitamin D is also needed for the normal development and growth of muscle fibers. In addition,

inadequate vitamin D levels can adversely affect muscle strength and lead to muscle weakness and pain (myopathy)

Among postmenopausal women and older men, many clinical trials have shown that supplements of both vitamin D and calcium result in small increases in bone mineral density throughout the skeleton. They also help reduce fracture rates in institutionalized older people.

All adults should consume recommended amounts of vitamin D and calcium from foods and supplements if needed.

Cancer and Vitamin D

Laboratory and animal studies suggest that vitamin D might inhibit carcinogenesis and slow tumor progression by, for example, promoting cell differentiation and inhibiting metastasis.

Vitamin D might also have anti-inflammatory, immunomodulatory, proapoptotic, and antiangiogenic effects

Some observational studies show associations between low serum levels of 25(OH)D and increased risks of cancer.

Cardiovascular disease

Vitamin D helps regulate the renin-angiotensin-aldosterone system (and thereby blood pressure), vascular cell growth, and inflammatory and fibrotic pathways. Vitamin D deficiency is associated with vascular dysfunction, arterial stiffening, left ventricular hypertrophy, and hyperlipidemia. For these reasons, vitamin D has been linked to heart health and risk of CVD.

Observational studies support an association between higher serum 25(OH)D levels and a lower risk of CVD incidence and mortality. Other meta-analyses of prospective studies have found associations between lower vitamin D status measured by serum 25(OH)D levels or vitamin D intakes and an increased risk of ischemic stroke, ischemic heart disease, myocardial infarction, and early death

Depression

Vitamin D is involved in various brain processes, and vitamin D receptors are present on neurons and glia in areas of the brain thought to be involved in the pathophysiology of depression.

Multiple sclerosis

MS is an autoimmune disease of the central nervous system that damages the myelin sheath surrounding and protecting nerve cells in the brain and spinal cord. This damage hinders or blocks messages between the brain and body, leading to clinical features, such as vision loss, motor weakness, spasticity, ataxia, tremor, sensory loss, and cognitive impairment. Some people with MS eventually lose the ability to write, speak, or walk.

The geographical distribution of MS around the world is unequal. Few people near the equator develop the disease, whereas the prevalence is higher further north and south. This uneven distribution has led to speculation that lower vitamin D levels in people who have less sunlight exposure might predispose them to the disease.

Many epidemiological and genetic studies have shown an association between MS and low 25(OH)D levels before and after the disease begins. Observational studies suggest that adequate vitamin D levels might reduce the risk of contracting MS and, once MS is present, decrease the risk of relapse and slow the disease's progression.

Type 2 diabetes

Vitamin D plays a role in glucose metabolism. It stimulates insulin secretion via the vitamin D receptor on pancreatic beta cells and reduces peripheral insulin resistance through vitamin D receptors in the muscles and liver. Vitamin D might be involved in the pathophysiology of type 2 diabetes through its effects on glucose metabolism and insulin signaling as well as its ability to reduce inflammation and