Vitamin D3

Harness the Power of the Sun

- Supports mood, bone health, growth and development
- Reduces inflammation, auto-immunity and abnormal cellular growth & differentiation
- Pure D3 naturally sourced from lichen

Details
Vitamin D is best known for its role in aiding the absorption of calcium from the digestive system and promoting bone formation, but it has many other actions including balancing immune function and supporting mood. Vitamin D is synthesized by the skin following exposure to ultraviolet rays from sunlight, but many people do not spend enough time outdoors and become deficient in this essential vitamin. Vitamin D deficiency has been linked to numerous health conditions including osteoporosis, rickets, autoimmune conditions, diabetes, cancer, SAD (seasonal affective disorder), chronic pain and frequent infections.

There is an obvious need to supplement with extra vitamin D especially in the elderly and children, during the winter, and for people with chronic diseases. Vitamin D3 is the most effective form of supplemental vitamin D (compared to D2, a less absorbable form). AOR's Vitamin D3 is naturally and ethically sourced from lichen, a vegan source. Up to 1000 IU is considered safe for people of all ages from infants to seniors. Talk to your healthcare provider about taking higher doses.

Discussion
AOR’s Vegan Vitamin D3 is the first of its kind and is sustainably sourced from lichen. It is rapidly converted in the body to the active hormone 1,25-dihydroxycholecalciferol, and helps in the development and maintenance of bones, the absorption and use of calcium and phosphorus, and is a
factor in the maintenance of good health.

**Product Variation**

**Product Code**  | **Size**
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AOR04188 | 120 VEGI-CAPS

**Supplements Facts**

**Serving Size:** 1 Capsule

<table>
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<th>Amount</th>
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**Non-medical ingredients:**
- microcrystalline cellulose, corn starch, maltodextrin, sucrose, tocopherol, ascorbyl palmitate, silicon dioxide.
- Capsule: hypromellose.

**Guarantees**

AOR™ guarantees that no ingredients not listed on the label have been added to the product. Contains no wheat, gluten, nuts, peanuts, sesame seeds, sulphites, mustard, soy, dairy, eggs, fish, shellfish or any animal byproduct.

**Adult Dosage**

Take 1 capsule daily with food, or as directed by a qualified health care practitioner.

**Cautions**

None known.

**Source**

Lichen from Vitashine™

**Main Application**

Bone health
- Autoimmune disorders
- Immune support
- Normal cellular growth and differentiation
- Children's health

**Disclaimer**
The information and product descriptions appearing on this website are for information purposes only, and are not intended to provide or replace medical advice to individuals from a qualified health care professional. Consult with your physician if you have any health concerns, and before initiating any new diet, exercise, supplement, or other lifestyle changes.

Research

Background

Vitamin D Deficiency

Vitamin D deficiency is widespread across all population groups because most of us do not get enough unprotected sunshine exposure. Most physicians recognize that the elderly population is at risk, however it is less appreciated that children, young adults and middle age groups are also at risk. Supplementing with vitamin D can have a positive impact on the ability of the body to fight against illness; it may also benefit mood, healthy cellular growth, chronic pain, autoimmune disorders and many other health conditions.

A Truly Vegan Vitamin D3

Finally, a true vegan, non-soy sourced vitamin D3 is available! AOR’s Vegan Vitamin D3 is derived from harvested lichen.

Lichens are plant-like substances made up of symbiotic fungi and, in this case, algae, which work together and depend on one another for survival in a mutually beneficial way. Lichens have been used for food, medicine and other purposes for thousands of years. The lichen used in this formula is sustainably harvested from multiple locations to achieve the highest quantity of vitamin D3 produced. After washing, the oily components are extracted from the lichen, leaving behind water-soluble components and naturally occurring acids. The oily extract is then purified and standardized for vitamin D3 content. Other components of the oily extract present in trace amounts include ergocalciferol, oleic acid and gamma linolenic acid (GLA).

Research

The Need for Sunshine

UVB exposure to the skin epidermis produces vitamin D, which then undergoes hydroxylation (addition of OH or hydroxyl group) first in the liver and then in the kidneys to produce the active hormone 1, 25-dihydroxy vitamin D. Studies have shown that children in areas ranging from Madrid, Spain to Maine, New York were approximately 50% deficit in vitamin D in the winter months. Apart from those who live in equilateral regions, most people do not synthesize sufficient amounts of vitamin D. For instance, in Edmonton, which is 52N, vitamin D synthesis is impaired from October through to March. This problem is further accentuated by misinformation and inappropriate statements of avoiding sun and overuse of sunscreen by public health services. No doubt sun over exposure is associated strongly with skin cancer but too little vitamin D synthesis also has its own unique health problems.
Multiple Purposes

Vitamin D deficiencies have been associated with blood pressure imbalances, increased autoimmune disorders, chronic pain, premenstrual syndrome (PMS), poor immunity, blood sugar imbalances, mood changes and even an increased risk of mortality by all causes. Studies also suggest that vitamin D has important immunological and antibacterial effects, and may be important for preventing infections and even the common cold.

Pregnancy & Infants

Vitamin D supplementation is also important during pregnancy and at very young ages, as inadequate vitamin D levels early in life have been associated with an increased risk of autoimmune disorders like multiple sclerosis, breathing disorders and metabolic disorders later in life. There may also be a link between vitamin D and autism, as autism is much more prevalent in areas of low sunlight. Vitamin D has also been shown to play a role in immunity, and may help to prevent placental infections during pregnancy.

Bone Health for Children

The most well-known role of vitamin D is its involvement in maintaining healthy bones. In children, vitamin D is essential for the proper growth and development of bones, and deficiency can result in rickets. Vitamin D is critical for bone health because it is required for the efficient utilization of dietary calcium. If vitamin D levels are too low, the body will begin to break down the bones to access calcium stores. Research has shown that vitamin D supplementation early in life leads to higher bone mineral density (BMD) at 7-9 years of age, and that adolescents with low vitamin D levels have lower BMD.

Bone Health for Adults

1, 25(OH) D is responsible for not only the bone development and growth in children and maintenance of bone in adults, but also for the prevention of osteoporosis and fractures in the elderly. In adults, supplementation with 800 IU of vitamin D has been linked to a 26% reduction of hip fractures and a 23% reduction in non-vertebral fractures. In adults and older individuals, vitamin D deficiency results in osteomalacia (a softening of the bones), a condition characterized by inadequate bone mineralization. Vitamin D is essential for the efficient utilization of dietary calcium. Blood calcium levels are tightly regulated. In a vitamin D deficient state, the amount of calcium absorbed is inadequate to satisfy the body’s requirement, this causes the body to release the hormone PTH (parathyroid hormone) which activates the cells (osteoclasts) to breakdown the bone to get the much needed calcium. This results in osteopenia and osteoporosis.

Additionally, PTH causes the kidneys to excrete phosphate and the overall net result is a decrease in calcium phosphate, the major mineral required for mineralizing bone. The bone building cells-osteoblasts continue to deposit collagen matrix, resulting in rubbery matrix which expands upon hydration and causes pressure and a low grade unrelenting pain often misdiagnosed as fibromyalgia.

D Deficiency & Pain

One study found low levels of vitamin D in one in four patients who suffer from chronic pain. Patients
with inadequate levels of vitamin D required nearly twice the dose of morphine that was used by patients with normal levels, and the vitamin D deficiency group used morphine for an average of 71.1 months compared to 43.8 months for non-deficient patients. These results led the researchers to hypothesize that while vitamin D deficiency is not the principle cause of chronic pain, it may be a contributing factor, and one that can be alleviated by supplementation.

Muscular Function

Vitamin D is also important in the function of muscles. Research has shown that young girls (12-14 years old) with higher vitamin D levels demonstrate greater muscle power than those with lower levels. Muscle weakness, pain and changes in gait have been described in vitamin D insufficiency. This may be the reason that the elderly have more falls and consequently increased fracture rates.

Market Trends

In recent years, the importance of vitamin D has been widely publicized, and it has become like the new vitamin C, a cure-all. Many people have been found to be deficient in it, and it is critical for the maintenance of health and wellness. More and more research is uncovering the link between vitamin D deficiency and many health conditions and diseases. The most common forms of vitamin D are vitamin D2 (found in plants) and Vitamin D3 (derived from animal sources). Vitamin D3 is better absorbed than D2.

AOR Advantage

AOR’s Vitamin D3 provides and effective source of natural vitamin D3 from lanolin, a naturally occurring oil found in the wool of sheep. No harm comes to the animals during shearing. Vitamin D3 is much better absorbed than Vitamin D2, which is a plant source. AOR offers vitamin D3 in capsule and in several liquid formats including a children’s formula for your convenience.

References


Hooten WM. Vitamin D inadequacy may exacerbate chronic pain. American Society of Anesthesiologists. 2007.

Abstract

Serum 25-Hydroxyvitamin D Concentrations and Risk for Hip Fractures


Background: The relationship between serum 25-hydroxyvitamin D [25(OH) vitamin D] concentration and hip fractures is unclear. Objective: To see whether low serum 25(OH) vitamin D concentrations are associated with hip fractures in community-dwelling women.

Design: Nested case-control study.

Setting: 40 clinical centers in the United States.

Participants: 400 case-patients with incident hip fracture and 400 control participants matched on the basis of age, race or ethnicity, and date of blood draw. Both groups were selected from 39 795
postmenopausal women who were not using estrogens or other bone-active therapies and who had not had a previous hip fracture.

**Measurements:** Serum 25(OH) vitamin D was measured and patients were followed for a median of 7.1 years (range, 0.7 to 9.3 years) to assess fractures.

**Results:** Mean serum 25(OH) vitamin D concentrations were lower in case-patients than in control participants (55.95 nmol/L [SD, 20.28] vs. 59.60 nmol/L [SD, 18.05]; P = 0.007), and lower serum 25(OH) vitamin D concentrations increased hip fracture risk (adjusted odds ratio for each 25-nmol/L decrease, 1.33 [95% CI, 1.06 to 1.68]). Women with the lowest 25(OH) vitamin D concentrations (47.5 nmol/L) had a higher fracture risk than did those with the highest concentrations (70.7 nmol/L) (adjusted odds ratio, 1.71 [CI, 1.05 to 2.79]), and the risk increased statistically significantly across quartiles of serum 25(OH) vitamin D concentration (P for trend = 0.016). This association was independent of number of falls, physical function, frailty, renal function, and sex-steroid hormone levels and seemed to be partially mediated by bone resorption.

**Limitations:** Few case-patients were nonwhite women. Bone mineral density and parathyroid hormone levels were not accounted for in the analysis.

**Conclusion:** Low serum 25(OH) vitamin D concentrations are associated with a higher risk for hip fracture.

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**Correlation between vitamin D(3) deficiency and insulin resistance in pregnancy.**


**Maghbooli Z, Hossein-Nezhad A, Karimi F, Shafaei AR, Larijani B.**

**BACKGROUND:** The serum level of 25-hydroxyvitamin D deficiency has long been suspected as a risk factor for glucose intolerance and perhaps 1,25-dihydroxyvitamin D has a role in the regulation of insulin secretion. This study investigates the relation between 25-hydroxyvitamin D concentrations and insulin resistance in pregnant women.

**METHODS:** A cross-sectional study was conducted on 741 pregnant women referred to five educating hospital clinics. Universal screening was performed with a GCT-50 g, and those with plasma glucose levels ≥ 7.2 mmol/L were diagnosed as GDM if they had an impaired GTT-100 g based on Carpenter and Coustan criteria. The levels of insulin and C-peptide were measured during OGTT-100 g test. The homeostasis model assessment index (HOMA) equation was used as the insulin resistance index. The concentrations of 25-hydroxyvitamin D, and PTH were also measured.

**RESULTS:** Total prevalence of vitamin D deficiency ( CONCLUSIONS: These results show that a positive correlation of 25(OH) vitamin D concentrations with insulin sensitivity and vitamin D deficiency could be a confirmative sign of insulin resistance.
Independent Association of Low Serum 25-Hydroxyvitamin D and 1,25-Dihydroxyvitamin D Levels With All-Cause and Cardiovascular Mortality.


BACKGROUND: In cross-sectional studies, low serum levels of 25-hydroxyvitamin D are associated with higher prevalence of cardiovascular risk factors and disease. This study aimed to determine whether endogenous 25-hydroxyvitamin D and 1,25-dihydroxyvitamin D levels are related to all-cause and cardiovascular mortality.

METHODS: Prospective cohort study of 3258 consecutive male and female patients (mean [SD] age, 62 [10] years) scheduled for coronary angiography at a single tertiary center. We formed quartiles according to 25-hydroxyvitamin D and 1,25-dihydroxyvitamin D levels within each month of blood drawings. The main outcome measures were all-cause and cardiovascular deaths.

RESULTS: During a median follow-up period of 7.7 years, 737 patients (22.6%) died, including 463 deaths from cardiovascular causes. Multivariate-adjusted hazard ratios (HRs) for patients in the lower two 25-hydroxyvitamin D quartiles (median, 7.6 and 13.3 ng/mL [to convert 25-hydroxyvitamin D levels to nanomoles per liter, multiply by 2.496]) were higher for all-cause mortality (HR, 2.08; 95% confidence interval [CI], 1.60-2.70; and HR, 1.53; 95% CI, 1.17-2.01; respectively) and for cardiovascular mortality (HR, 2.22; 95% CI, 1.57-3.13; and HR, 1.82; 95% CI, 1.29-2.58; respectively) compared with patients in the highest 25-hydroxyvitamin D quartile (median, 28.4 ng/mL). Similar results were obtained for patients in the lowest 1,25-dihydroxyvitamin D quartile. These effects were independent of coronary artery disease, physical activity level, Charlson Comorbidity Index, variables of mineral metabolism, and New York Heart Association functional class. Low 25-hydroxyvitamin D levels were significantly correlated with variables of inflammation (C-reactive protein and interleukin 6 levels), oxidative burden (serum phospholipid and glutathione levels), and cell adhesion (vascular cell adhesion molecule 1 and intercellular adhesion molecule 1 levels).

CONCLUSIONS: Low 25-hydroxyvitamin D and 1,25-dihydroxyvitamin D levels are independently associated with all-cause and cardiovascular mortality. A causal relationship has yet to be proved by intervention trials using vitamin D.

Vitamin D Deficiency and Risk of Cardiovascular Disease.

Circulation published online Jan 7, 2008.

Thomas J. Wang, Michael J. Pencina, Sarah L. Booth, Paul F. Jacques, Erik Ingelsson, Katherine Lanier, Emelia J. Benjamin, Ralph B. DAgostino, Myles Wolf and Ramachandran S. Vasan

Background-Vitamin D receptors have a broad tissue distribution that includes vascular smooth
muscle, endothelium, and cardiomyocytes. A growing body of evidence suggests that vitamin D deficiency may adversely affect the cardiovascular system, but data from longitudinal studies are lacking.

Methods and Results-We studied 1739 Framingham Offspring Study participants (mean age 59 years; 55% women; all white) without prior cardiovascular disease. Vitamin D status was assessed by measuring 25-dihydroxyvitamin D (25-OH D) levels. Prespecified thresholds were used to characterize varying degrees of 25-OH D deficiency (15 ng/mL, 10 ng/mL). Multivariable Cox regression models were adjusted for conventional risk factors. Overall, 28% of individuals had levels 15 ng/mL, and 9% had levels 10 ng/mL. During a mean follow-up of 5.4 years, 120 individuals developed a first cardiovascular event. Individuals with 25-OH D 15 ng/mL had a multivariable-adjusted hazard ratio of 1.62 (95% confidence interval 1.11 to 2.36, P < 0.01) for incident cardiovascular events compared with those with 25-OH D 15 ng/mL. This effect was evident in participants with hypertension (hazard ratio 2.13, 95% confidence interval 1.30 to 3.48) but not in those without hypertension (hazard ratio 1.04, 95% confidence interval 0.55 to 1.96). There was a graded increase in cardiovascular risk across categories of 25-OH D, with multivariable-adjusted hazard ratios of 1.53 (95% confidence interval 1.00 to 2.36) for levels 10 to 15 ng/mL and 1.80 (95% confidence interval 1.05 to 3.08) for levels 10 ng/mL (P for linear trend < 0.01). Further adjustment for C-reactive protein, physical activity, or vitamin use did not affect the findings.

Conclusions-Vitamin D deficiency is associated with incident cardiovascular disease. Further clinical and experimental studies may be warranted to determine whether correction of vitamin D deficiency could contribute to the prevention of cardiovascular disease.

Higher serum vitamin D concentrations are associated with longer leukocyte telomere length in women.


BACKGROUND: Vitamin D is a potent inhibitor of the proinflammatory response and thereby diminishes turnover of leukocytes. Leukocyte telomere length (LTL) is a predictor of aging-related disease and decreases with each cell cycle and increased inflammation.

OBJECTIVE: The objective of the study was to examine whether vitamin D concentrations would attenuate the rate of telomere attrition in leukocytes, such that higher vitamin D concentrations would be associated with longer LTL. DESIGN: Serum vitamin D concentrations were measured in 2160 women aged 18-79 y (mean age: 49.4) from a large population-based cohort of twins. LTL was measured by using the Southern blot method.

RESULTS: Age was negatively correlated with LTL (r = -0.40, P < 0.0001). Serum vitamin D concentrations were positively associated with LTL (r = 0.07, P = 0.0010), and this relation persisted after adjustment for age (r = 0.09, P < 0.0001) and other covariates (age, season of vitamin D measurement, menopausal status, use of hormone replacement therapy, and physical activity; P for trend across tertiles = 0.003). The difference in LTL between the highest and lowest tertiles of vitamin
D was 107 base pairs (P = 0.0009), which is equivalent to 5.0 y of telomeric aging. This difference was further accentuated by increased concentrations of C-reactive protein, which is a measure of systemic inflammation.

CONCLUSION: Our findings suggest that higher vitamin D concentrations, which are easily modifiable through nutritional supplementation, are associated with longer LTL, which underscores the potentially beneficial effects of this hormone on aging and age-related diseases.

**Association between serum vitamin D metabolite levels and disease activity in patients with early inflammatory polyarthritis.**

*Arthritis Rheum.* 2007 Jun 28;56(7):2143-2149

Patel S, Farragher T, Berry J, Bunn D, Silman A, Symmons D.

OBJECTIVE: Previous in vitro and animal studies have suggested that vitamin D, in particular, its metabolite 25-hydroxyvitamin D (25(OH)D), may have immunomodulatory effects. To study further the potential immunomodulatory effects of vitamin D in humans, we explored the hypothesis that serum vitamin D metabolites may be inversely associated with current disease activity, severity, and functional disability in patients with early inflammatory polyarthritis (IP).

METHODS: We studied 206 consecutive patients with IP who were enrolled in the Norfolk Arthritis Register between January 2000 and November 2003 inclusive. Patients were studied within 6 months of symptom onset. None of the patients was taking steroids, and all had received.

RESULTS: The median age at symptom onset was 59 years (range 20-88 years), with a median disease duration of 4 months. At baseline, there was an inverse relationship between 25(OH)D levels and the tender joint count, DAS28 score, and HAQ score. The only inverse relationship with 1,25(OH)(2)D was with the HAQ score. Each 10-ng/ml increase in the level of 25(OH)D was associated with a decrease in the DAS28 score of 0.3 and in the CRP level of approximately 25%. At 1 year, the only significant result was an inverse association between baseline vitamin D metabolite levels and the HAQ score; that is, those with higher metabolite levels had lower HAQ scores.

CONCLUSION: These data provide further support that vitamin D plays an immunomodulatory role in inflammatory arthritis. This association needs to be examined in other cohorts of patients with early IP, as well as in longitudinal studies. If confirmed, the clinical response to vitamin D supplementation should be examined in early IP.

**Vitamin D-deficiency rickets among children in Canada.**

*CMAJ.* 2007 Jun 28

Ward LM, Gaboury I, Ladhani M, Zlotkin S.

BACKGROUND: Based on regional and anecdotal reports, there is concern that vitamin D deficiency rickets is persistent in Canada despite guidelines for its prevention. We sought to determine the
incidence and clinical characteristics of vitamin D deficiency rickets among children living in Canada.

METHODS: A total of 2325 Canadian pediatricians were surveyed monthly from July 1, 2002, to June 30, 2004, through the Canadian Paediatric Surveillance Program to determine the incidence, geographic distribution and clinical profiles of confirmed cases of vitamin D-deficiency rickets. We calculated incidence rates based on the number of confirmed cases over the product of the length of the study period (2 years) and the estimates of the population by age group.

RESULTS: There were 104 confirmed cases of vitamin D deficiency rickets during the study period. The overall annual incidence rate was 2.9 cases per 100 000. The incidence rates were highest among children residing in the north (Yukon Territory, Northwest Territories and Nunavut). The mean age at diagnosis was 1.4 years (standard deviation [SD] 0.9, minâmax 2 weeksâ6.3 years). Sixty-eight children (65%) had lived in urban areas most of their lives, and 57 (55%) of the cases were identified in Ontario. Ninety-two (89%) of the children had intermediate or darker skin. Ninety-eight percent (94%) had been breastfed, and 3 children (2.9%) had been fed standard infant formula. None of the breast-fed infants had received vitamin D supplementation according to current guidelines (400 IU/d). Maternal risk factors included limited sun exposure and a lack of vitamin D from diet or supplements during pregnancy and lactation. The majority of children showed clinically important morbidity at diagnosis, including hypocalcemic seizures (20 cases, 19%).

INTERPRETATION: Vitamin Dâdeficiency rickets is persistent in Canada, particularly among children who reside in the north and among infants with darker skin who are breastfed without appropriate vitamin D supplementation. Since there were no reported cases of breast-fed children having received regular vitamin D (400 IU/d) from birth who developed rickets, the current guidelines for rickets prevention can be effective but are not being consistently implemented. The exception appears to be infants, including those fed standard infant formula, born to mothers with a profound vitamin D deficiency, in which case the current guidelines may not be adequate to rescue infants from the vitamin D-deficient state.

1,25-dihydroxyvitamin D(3) reverses experimental autoimmune encephalomyelitis by inhibiting chemokine synthesis and monocyte trafficking.

J Neurosci Res. 2007 Jun 28

Pedersen LB, Nashold FE, Spach KM, Hayes CE.

Multiple sclerosis (MS) is a complex neurodegenerative disease whose pathogenesis involves genetic and environmental risk factors leading to an aberrant, neuroantigen-specific, CD4( ) T cell-mediated autoimmune response. In support of the hypothesis that vitamin D(3) may reduce MS risk and severity, we found that vitamin D(3) and 1,25-dihydroxyvitamin D(3) (1,25-(OH)(2)D(3)) inhibited induction of experimental autoimmune encephalomyelitis (EAE), an MS model. To investigate how 1,25-(OH)(2)D(3) could carry out anti-inflammatory functions, we administered 1,25-(OH)(2)D(3) or a placebo to mice with EAE, and subsequently analyzed clinical disease, chemokines, inducible nitric oxide synthase (iNOS), and recruitment of dye-labeled monocytes. The 1,25-(OH)(2)D(3) treatment significantly reduced clinical EAE severity within 3 days. Sharp declines in chemokines, inducible iNOS, and CD11b( ) monocyte recruitment into the central nervous system (CNS) preceded this clinical disease abatement in the 1,25-(OH)(2)D(3)-treated animals. The 1,25-(OH)(2)D(3) did not
directly and rapidly inhibit chemokine synthesis in vivo or in vitro. Rather, the 1,25-(OH)(2)D(3) rapidly stimulated activated CD4( ) T cell apoptosis in the CNS and spleen. Collectively, these results support a model wherein inflammation stimulates a natural anti-inflammatory feedback loop. The activated inflammatory cells produce 1,25-(OH)(2)D(3), and this hormone subsequently enhances the apoptotic death of inflammatory CD4( ) T cells, removing the driving force for continued inflammation. In this way, the sunlight-derived hormone could reduce the risk of chronic CNS inflammation and autoimmune-mediated neurodegenerative disease.

**Vitamin D and its implications for musculoskeletal health in women: An update.**

*Maturitas.* 2007 Jun 28;

Pérez-López FR.

Vitamin D is a hormone that controls phosphorus, calcium, and bone metabolism and neuromuscular function. Vitamin D synthesis is a process in which the skin, liver, and kidney are sequentially involved. The vitamin D pool is completed by the amount taken with food and supplements. Vitamin D deficiency causes osteopenia, precipitates and exacerbates osteoporosis, causes a painful disease, osteomalacia, and increases muscle weakness, which worsens the risk of falls and fractures. A high prevalence of vitamin D insufficiency exists in the apparently healthy population, osteoporotic patients, and patients with prior fractures. Factors contributing to low vitamin D levels include low sunlight exposure, decreased skin synthesis and intestinal absorption, and inadequate diet. The simplest way to correct hypovitaminosis is adequate nutrition and supplements. However, few patients with osteoporosis and/or fractures, receive adequate supplements. Vitamin D insufficiency may alter the regulatory mechanisms of parathyroid hormone and may induce a secondary hyperparathyroidism that increases the risk of osteoporosis and fractures, although the necessary degree of this is not established. Monitoring of serum 25-hydroxyvitamin D levels is the only way to assess vitamin D status. The ideal healthy blood levels of 25-hydroxyvitamin D are controversial, although a range from 30 to 60ng/mL is widely accepted. The role of vitamin D supplementation is to provide humans with the nutrient in an amount closer to the biological norm for our species. This amount of vitamin D results in optimal function of many aspects of health, including balance and muscle strength, thus reducing the risk of fracture beyond what is possible via the quality and quantity of bone itself.

**Pharmacological treatment of osteoporosis for people over 70.**


Moro Alvarez MJ, Díaz-Curiel M.

Osteoporosis has been defined as “a systemic disease characterized by low bone mass and microarchitectural deterioration of bone tissue, with consequent increase in bone fragility and susceptibility to fracture”. The impact of osteoporosis is most pronounced in elderly populations who run the greatest risk of fractures. The probability of developing mainly hip, vertebral and other non-vertebral fractures (for example, a Colles fracture) not only depends on bone mineral density (BMD)
but also on age. Older patients are more susceptible to fracture than younger patients with the same BMD T-score. As the older population increases, the incidence of osteoporotic fractures is expected to rise dramatically over the next few decades. Although hip fractures are considered to be the most severe and economically important osteoporotic fracture, vertebral fractures also lead to adverse health outcomes, including back pain, height loss and kyphosis. These changes may result in significant declines in physical performance, function and, ultimately, loss of independence. The challenge for physicians is to prevent bone loss, to diagnose and treat osteoporosis before fractures occur, and to treat patients who have already experienced a fracture to prevent recurrent fractures. The objective of this review is to analyze the capacity to reduce fractures as the key element to evaluate the effectiveness of available medications: calcium and Vitamin D, bone formation drugs, antiresortive drugs, and dualeffect drugs. In view of the paucity of information about treatment of osteoporosis in the elderly population, available studies were not designed with this objective, so that this article reviews data mostly deriving from post-hoc analysis or sub-analysis of the main phase III clinical trials of each of the tested medications.

Prevalence of vitamin D insufficiency in elderly ambulatory outpatients in Denver, Colorado.


Linnebur SA, Vondracek SF, Griend JP, Ruscin JM, McDermott MT.

BACKGROUND: Vitamin D insufficiency is common in the elderly. However, previous studies have utilized 25-hydroxvitamin D (25[OH]D) concentrations as low as OBJECTIVE: The goal of this study was to characterize vitamin D concentrations in ambulatory elderly living in metropolitan Denver, Colorado, utilizing 25(OH)D concentrations METHODS: Ambulatory older adults (aged 65-89 years) with clinic visits during December 2005 and January 2006 were enrolled. Serum concentrations of 25(OH)D, parathyroid hormone (PTH), calcium, phosphorus, creatinine, and albumin were measured; height and weight were also measured. Data regarding dietary and over-the-counter vitamin D intake were collected, as well as information on body mass index, history of osteoporosis, osteoporosis treatment, and history of falls and fractures.

RESULTS: Eighty patients (mean [SD] age, 77.8 [5.3] years; age range, 66-89 years) completed the study; there were no dropouts. The majority of patients were white (88%) and female (68%). Fifty-nine (74%) were found to have vitamin D insufficiency. Mean total and over-the-counter vitamin D intake was significantly higher in sufficient (P < 0.01) and insufficient (P < 0.05) patients compared with deficient patients, but dietary intake did not differ significantly between groups. The majority of patients who were vitamin D insufficient consumed more than the recommended 400 to 600 IU/d of vitamin D. Obese patients were found to have significantly lower 25(OH)D concentrations (P < 0.001) and higher PTH concentrations (P = 0.04) than nonobese patients.

CONCLUSIONS: Vitamin D insufficiency is prevalent in ambulatory, and especially obese, elderly living in Denver, Colorado, despite vitamin D intake consistent with national recommendations. Dietary intake of vitamin D appeared to be unreliable to prevent insufficiency. Based on our results, along with other published data, we feel that national recommendations for vitamin D intake in the elderly should be increased to at least 800 to 1000 IU/d of over-the-counter supplemental cholecalciferol.
Vitamin D2 is much less effective than vitamin D3 in humans.


Armas LA, Hollis BW, Heaney RP.

Vitamins D(2) and D(3) are generally considered to be equivalent in humans. Nevertheless, physicians commonly report equivocal responses to seemingly large doses of the only high-dose calciferol (vitamin D(2)) available in the U.S. market. The relative potencies of vitamins D(2) and D(3) were evaluated by administering single doses of 50,000 IU of the respective calciferols to 20 healthy male volunteers, following the time course of serum vitamin D and 25-hydroxyvitamin D (25OHD) over a period of 28 d and measuring the area under the curve of the rise in 25OHD above baseline. The two calciferols produced similar rises in serum concentration of the administered vitamin, indicating equivalent absorption. Both produced similar initial rises in serum 25OHD over the first 3 d, but 25OHD continued to rise in the D(3)-treated subjects, peaking at 14 d, whereas serum 25OHD fell rapidly in the D(2)-treated subjects and was not different from baseline at 14 d. Area under the curve (AUC) to d 28 was 60.2 ng.d/ml (150.5 nmol.d/liter) for vitamin D(2) and 204.7 (511.8) for vitamin D(3) (P < 0.002). Calculated AUC(infinity) indicated an even greater differential, with the relative potencies for D(3):D(2) being 9.5:1. Vitamin D(2) potency is less than one third that of vitamin D(3). Physicians resorting to use of vitamin D(2) should be aware of its markedly lower potency and shorter duration of action relative to vitamin D(3).