Vit D3 biosyn®

Dietary supplement with vitamin D_3

New at biosyn

for a healthy immune system
and functioning cell division

we are
research

biosyn®

Why Vit D3 biosyn®?

- One drop a day suffices
- Easily dosable, simple dose adjustment
- Well-tolerated

One drop a day suffices

One drop of Vit D3 biosyn® contains 25 µg or 1,000 I.E. vitamin D3. Therefore only one drop more than covers the complete daily requirement.

Easily dosable, simple dose adjustment

A special dropper bottle ensures unproblematic and exact dosing. The dose can be easily adapted by a slight change to the number of drops administered. This is appropriate, for instance, for weekly instead of daily intake.
The human body can store vitamin D3 well. A weekly or even monthly intake is therefore also possible.

Well-tolerated

Vit D3 biosyn® is produced without using milk sugar, gluten, gelatin, yeast or preservatives. Vit D3 biosyn® contains no allergy-triggering constituents.

Vit D3 biosyn® – higher dosed considering the newest recommendation of the German Nutrition Association (DGE)

Contents	One drop (0.025 mL)	% NRV*	% DGE**
Vitamin D3	1,000 I.E. = 25 µg	500 %	125 %

I.E. = international units

* Reference quantities for the daily intake of vitamins and minerals – nutrient reference values (NRV)

** The German Association of Nutrition (DGE) recommends 20 µg vitamin D a day to compensate the lack of endogenous synthesis

Dosage recommendation

The dosage recommendation is based on the latest scientific knowledge for healthy people, the intake of certain medications, and for different disorders.

Vit D_3 biosyn® for vitamin D_3 deficiency		
		Daily dosage recommendation
Adult	Normal weight	2,000 I.E. [8]
	Overweight	3,000 I.E. [8]
	Adiposity	6,000 I.E. [8]
Pregnant women		4,000 I.E. [21]
Nursing		6,400 I.E. [22]
Children	for increased risk of a vitamin D_3 deficiency	600 – 1,000 I.E. [23]
	for vitamin D_3 deficiency	2,000 I.E. [23] for 6 weeks

I.E. = international units

[8] Faurschou A, Beyer DM, Schmedes A, Bogh MK, Philipsen PA, Wulf HC. Br J Dermatol. 2012 Aug; 167(2): 391-5. doi: 10.1111/j.1365-2133.2012.11004.x. The relation between sunscreen layer thickness and vitamin D production after ultraviolet B exposure: a randomized clinical trial.

[21] Hollis BW, Johnson D, Hulsey TC, Ebeling M, Wagner CL. J Bone Miner Res. 2011 Oct; 26(10): 2341-57. doi: 10.1002/jbmr.463. Erratum in: J Bone Miner Res. 2011 Dec; 26(12): 3001. Vitamin D supplementation during pregnancy: double-blind, randomized clinical trial of safety and effectiveness.

[22] Hollis BW, Wagner CL, Howard CR, Ebeling M, Shary JR, Smith PG, Taylor SN, Morella K, Lawrence RA, Hulsey TC. Pediatrics. 2015 Oct; 136(4): 625-34. doi: 10.1542/peds.2015-1669. Maternal Versus Infant Vitamin D Supplementation During Lactation: A Randomized Controlled Trial.

[23] Vogiatzi MG, Jacobson-Dickman E, DeBoer MD; Drugs, and Therapeutics Committee of The Pediatric Endocrine Society. J Clin Endocrinol Metab. 2014 Apr; 99(4): 1132-41. doi: 10.1210/jc.2013-3655. Vitamin D supplementation and risk of toxicity in pediatrics: a review of current literature.

Vit D3 biosyn® with intake of certain medications

Medication	Application areas	Daily dosage recommendation
Glucocorticoids	Asthma, Crohn disease, rheumatism, Colitis ulcerosa	3,000 – 6,000 I.E.
St. John's wort	Depression	3,000 – 6,000 I.E.
Hypotensive agent	High blood pressure	3,000 – 6,000 I.E.
Proton pump inhibitors	Ulcer/reflux disease	3,000 – 6,000 I.E.
Anti-epileptics	Epilepsy	3,000 – 7,000 I.E.
Anti-retroviral active substances (HAART)	HIV	3,000 – 7,000 I.E.
Rifampicin	Tuberculosis	3,000 – 7,000 I.E.
Calcium	Osteoporosis	3,000 – 7,000 I.E.
Biphosphonate	Osteoporosis	3,000 – 6,000 I.E.
Antiestrogens	Cancer	4,000 – 8,000 I.E.
Cytostatics	Cancer	4,000 – 8,000 I.E.

I.E. = international units

Robien K, Oppeneer SJ, Kelly JA, Hamilton-Reeves JM. Nutr Clin Pract. 2013 Apr; 28(2): 194-208. doi: 10.1177/0884533612467824. Drug-vitamin D interactions: a systematic review of the literature.

Gröber U, Holick, MF, Vitamin D Die Heilkraft des Sonnenvitamins, 3., überarbeitete und erweiterte Auflage, Wissenschaftliche Verlagsgesellschaft Stuttgart, 2015.

Interactions

Vitamin A

Vitamin A can antagonize the effect of vitamin D_3.[1] This effect occurred both for higher vitamin D_3 doses as well as at physiological levels of both vitamins. On the molecular level, vitamin D_3 and A share a common partner for the receptor RXR. The receptor for vitamin D_3 dimerizes with RXR, while RXR alone or together with RAR acts as a mediator for the biological effects for the retinoic acids.

Magnesium

An increased plasma magnesium concentration raises secretion of the parathyroid hormone (PTH).[2] The synthesis of calcitriol (1.25[OH]2D3) is thereby stimulated. The secretion of PTH is impaired when there is a magnesium deficit. This leads to hypocalcaemia and the serum concentration of calcitriol declines. Patients with hypoparathyroidism are therefore resistant with respect to vitamin D_3 therapy, except if magnesium is supplemented at the same time.[3]

Medications

Ketoconazole, used to prevent and treat fungal skin disorders, increases the potency of calcitriol. Thiazide diuretics increase the reabsorption of calcium. Therefore the hypercalcemic effect of high-dose vitamin D_3 is reinforced and can trigger a hypercalcemia in older people or patients with restricted renal functions or hyperparathyroidism.[4] Glucocorticoids, phenobarbital and phenytoin antagonize the effect of vitamin D_3 on intestinal calcium absorption. Atorvastin increases the 25-hydroxy vitamin D_3 concentration. The simultaneous consumption of atorvastin and a vitamin D_3 supplement reduces the concentration of atorvastin.[4]

Table of Contents

Vitamin D3 – Vitamin with an exceptional position

Vitamin D3 holds a special position among the vitamins. Only 10 – 20 % is supplied by food. The body forms 80 – 90 % of vitamin D3 with the help of sunlight itself *(Fig. 1)*.

Vitamin D3 only occurs in foods to a limited extent. The concentration is highest in fatty fish varieties, for example salmon or herring. Also cod liver oil contains vitamin D3. It is therefore not possible to cover the intake of vitamin D3 with food. Since the body itself forms vitamin D3 with the help of UV radiation from the sun, one should expect that a vitamin D3 deficiency in Germany would present no problem, at least in the summer.

The body forms 80 – 90 % of the vitamin D3 itself – with the help of sunlight

Synthesis and tasks of vitamin D3

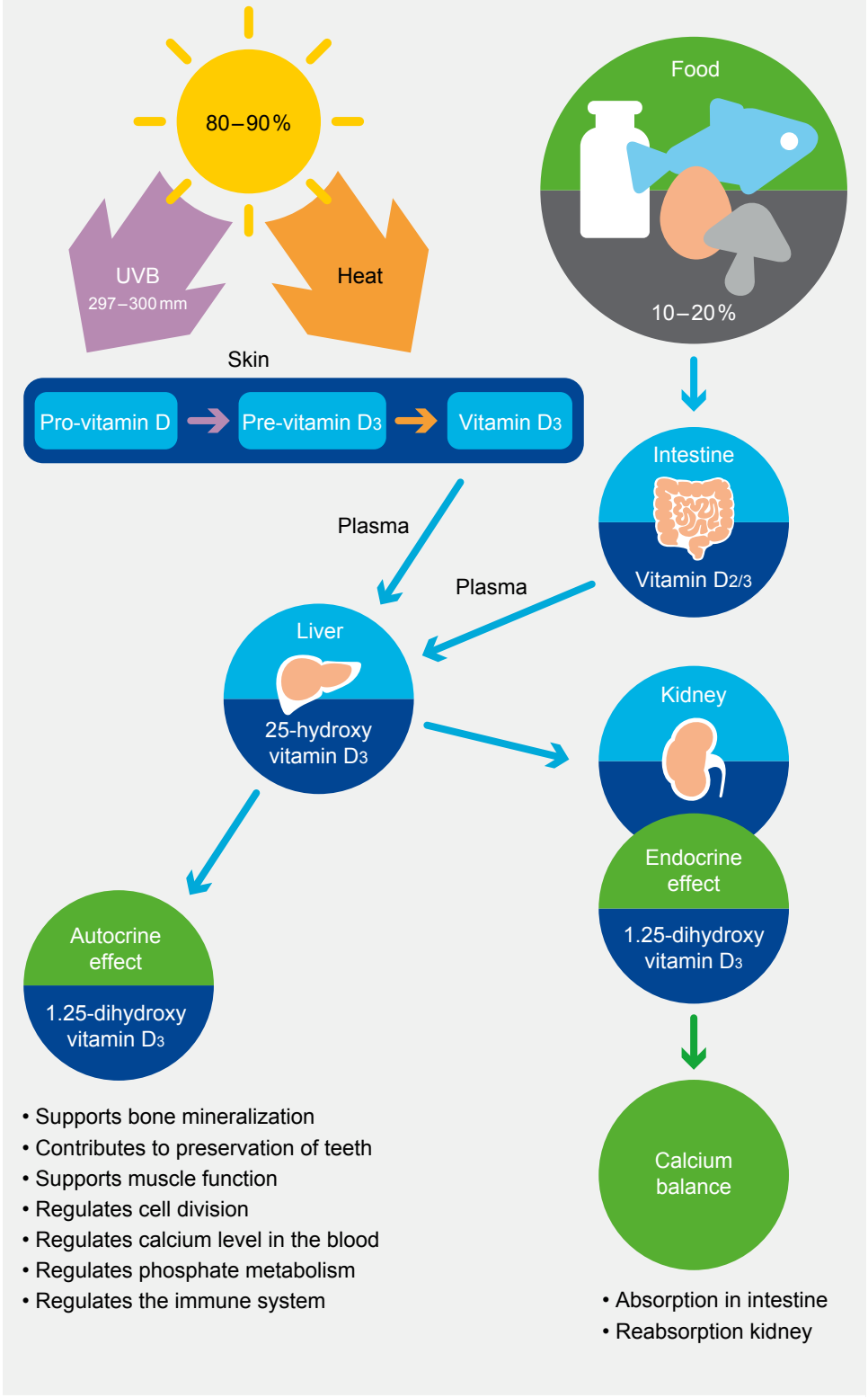

Fig. 1

What are the tasks of vitamin D3 in the body?

Cardiovascular system
• Effects the blood vessel muscles and the calcium level in the blood

Contributes to healthy functioning of the immune system
• Induces the differentiation of immune cells
• Reduces the release of pro-inflammatory cytokines
• Regulates the autoimmune processes

Intestines
• Supports the absorption of calcium and phosphate

Musculature
• Improves the capability of muscle fibers to pull together

Bones
• Supports bone mineralization

Tasks of vitamin D3 in the body

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Fig. 2

Vitamin D3 deficiency

A large-scale study with 1,763 men and 2,267 women was conducted in Germany.[5] The daily vitamin D3 intake was 2.81 µg for men and 2.31 µg for women. The German Association of Nutrition (DGE) recommends 20 µg vitamin D3 a day.

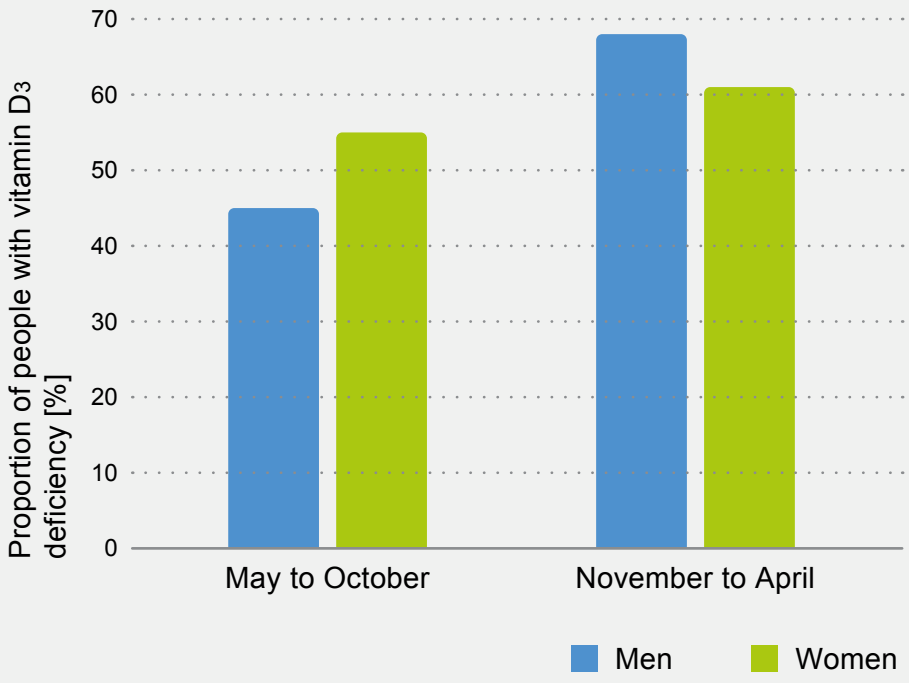
In Germany, a vitamin D3 deficiency is defined at < 20 ng/mL 25-hydroxy vitamin D3, the active form of vitamin D3, in the blood. 56.8 % of men were below this value. Among the women, 57.8 % showed a vitamin D3 deficiency.[5]

In addition, a relationship between the vitamin D3 status and the season could be determined *(Fig. 3)*. In winter, the problem of a vitamin D3 deficiency was aggravated because the intensity of solar radiation in Germany from November to April is too low to form sufficient vitamin D3. At the end of March, the vitamin D3 concentration in the serum was at its lowest, in June it was highest.

The study could also detect that an insufficient vitamin D3 status is connected with several “widespread diseases”. Women with high blood pressure, cardiovascular disorders and diabetes untreated with insulin showed significantly lower vitamin D3 values ($p < 0.001$) *(Fig. 4)*. Also men with insulin-treated diabetes showed this relationship as well ($p < 0.001$).

Vitamin D3 deficiency is broadly distributed and depends on the season

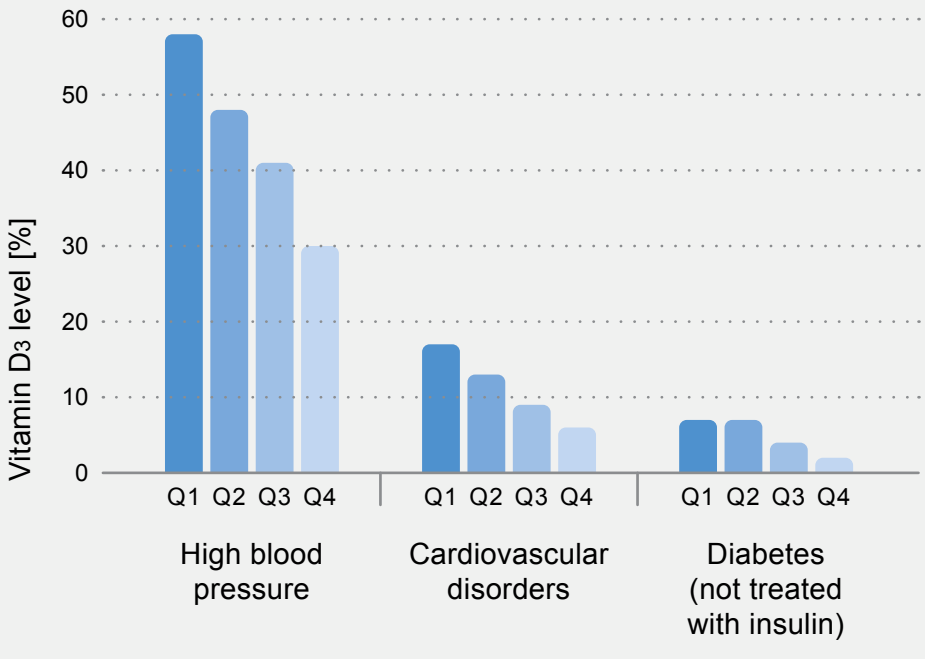
Vitamin D3 status depends on the season



Hintzpeter B, Mensink GB, Thierfelder W, Müller MJ, Scheidt-Nave C. Eur J Clin Nutr. 2008 Sep; 62(9): 1079-89. Vitamin D status and health correlates among German adults.

Fig. 3

Relationship between a vitamin D3 deficiency and so-called widespread diseases



Hintzpeter B, Mensink GB, Thierfelder W, Müller MJ, Scheidt-Nave C. Eur J Clin Nutr. 2008 Sep; 62(9): 1079-89. Vitamin D status and health correlates among German adults.

Fig. 4

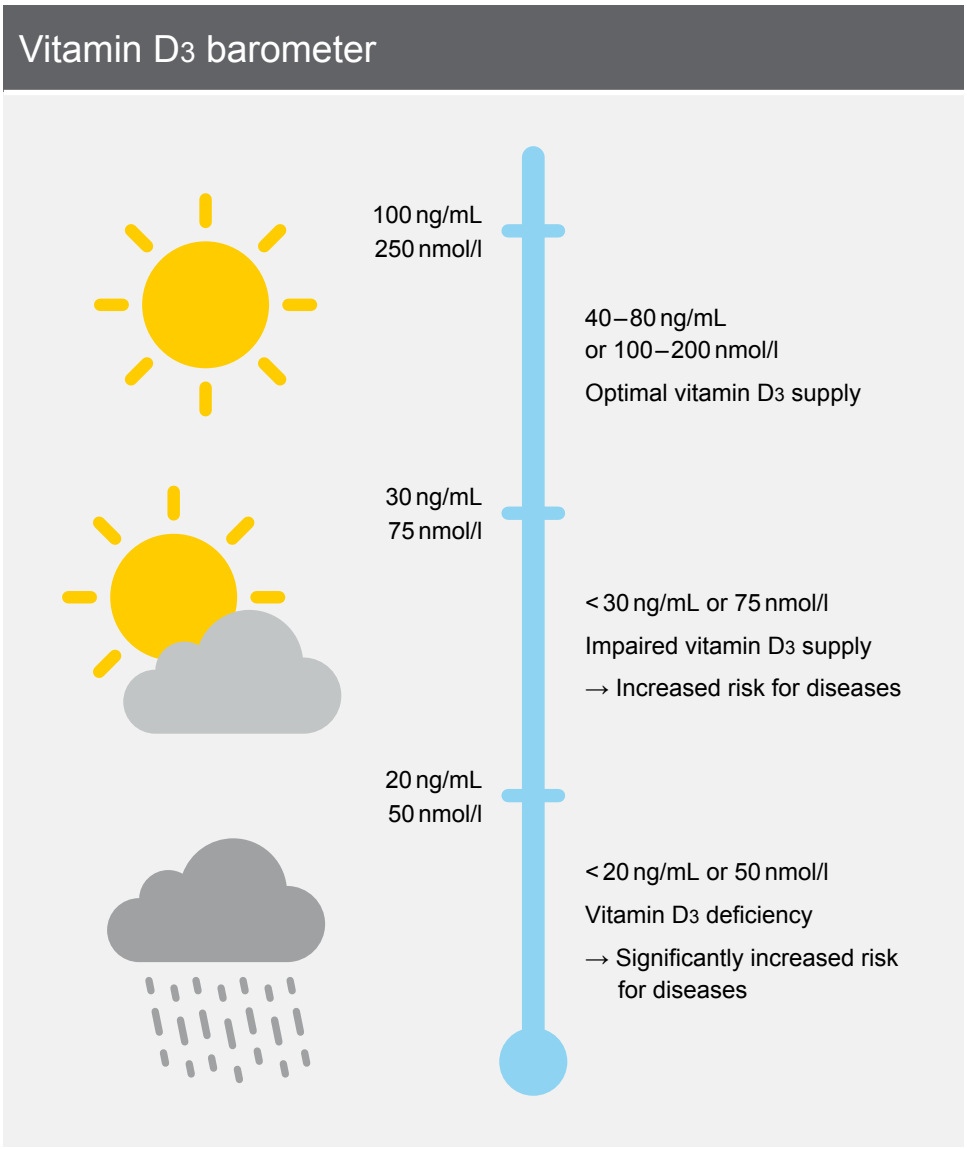
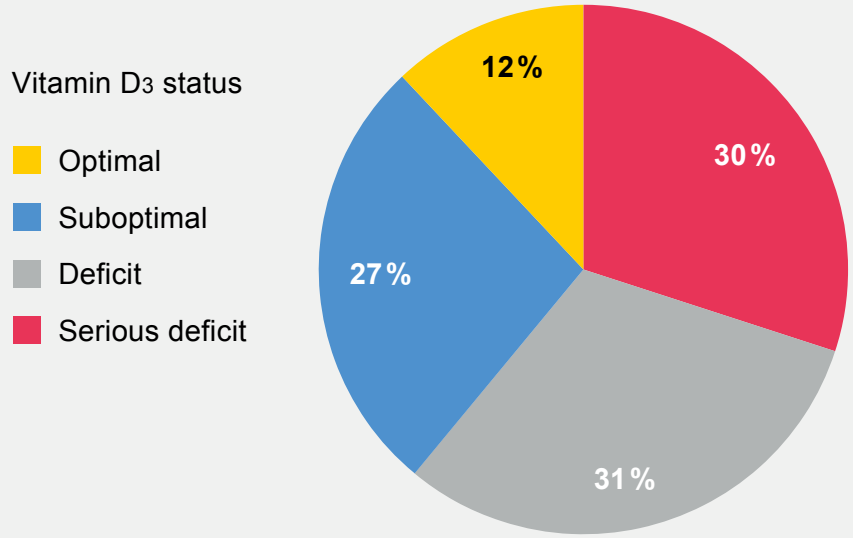


Fig. 5

What is an optimal vitamin D3 status?

In order to determine vitamin D3 status, the concentration of 25-hydroxy vitamin D3 in the blood is measured. A 25-hydroxy vitamin D3 concentration below 20 ng/mL is considered a vitamin D3 deficiency which significantly increase the risk for diverse disorders *(Fig. 5)*. A value between 20 ng/mL and 30 ng/mL is considered a restricted vitamin D3 supply. Meanwhile the range between 40 ng/mL and 80 ng/mL is regarded as the optimal vitamin D3 level. Especially for people older than 60 years, the 25-hydroxy vitamin D3 concentration in the blood should be greater than 30 ng/mL.

Vitamin D3 status for adults in Germany



Rabenberg M, Scheidt-Nave C, Busch MA, Rieckmann N, Hintzpeter B, Mensink GB. BMC Public Health. 2015 Jul 11; 15: 641. doi: 10.1186/s12889-015-2016-7. Vitamin D status among adults in Germany--results from the German Health Interview and Examination Survey for Adults (DEGS1).

Fig. 6

Almost a third of Germans suffer from serious vitamin D3 deficiency

In 2015, in an additional large-scale study (n = 6.995), the vitamin D3 status of Germans was investigated once again.[6] 61.6 % of the participants showed a value < 20 ng/mL 25-hydroxy vitamin D3 and thus had a vitamin D3 deficiency. For 30.2 % of Germans, the 25-hydroxy vitamin D3 concentration was even below 12 ng/mL *(Fig. 6)*. This corresponds to a serious vitamin D3 deficit. Only 11.8 % of the participants showed an optimal vitamin D3 status.

Impact of a vitamin D3 deficiency

A vitamin D3 deficiency can delay childhood growth and cause rickets.[7] For adults, a vitamin D3 deficiency can lead to osteopeny as well as accelerate its formation and increase the risk of fractures.[7]

Typical symptoms of a vitamin D3 deficiency are the loss of muscular strength and ostealgia

Vitamin D3 receptors are located in all skeletal muscles. A vitamin D3 deficiency therefore leads to a of muscular strength and swaying of the body. The risk of falls increases.[7]

Vitamin D3 deficiency can lead to a defect in bone mineralization which can lead to ostealgia. This symptom can frequently lead to an incorrect diagnoses such as fibromyalgia, dysthymia, arthritis, arthritis or chronic fatigue-syndrome.[7]

An inadequate Vitamin D3 status is associated with a multitude of disorders

A vitamin D3 deficiency increases the risk of getting cancer or dying from cancerous diseases.[7] For < 20 ng/mL 25-hydroxy Vitamin D3, the risk of contracting colorectal, breast, prostate or other types of cancer increases by 30 to 50 percent.[6]

Apart from cancer, numerous autoimmune disorders are associated with a vitamin D3 deficiency – among others diabetes, multiple sclerosis, rheumatic arthritis and Crohn disease.[7] Also the development and severity of infections are negatively influenced, such as tuberculosis, influenza and infections of the upper respiratory tract.

People with a Vitamin D3 deficiency are more vulnerable to depressions and schizophrenia.[7] They moreover show an increased risk for high blood pressure and cardiovascular disorders *(Fig. 7)*.

Impact of a Vitamin D3 deficit

Schizophrenia
Depression

Cardiovascular disorders
High blood pressure

Asthma
Forced exhalation volume
in one second

Loss of muscular strength
Muscle pain (myalgia)

Osteoporosis
Osteoarthritis
Osteomalacia
Rickets

Infections:
Tuberculosis
Influenza
Infections of the upper
respiratory tract

Autoimmune disorders:
Type 1 diabetes
Multiple sclerosis
Crohn disease
Rheumatic arthritis

Type 2 diabetes
Metabolic syndrome

Cancer:
breast, colon, prostate,
pancreas etc.

Fig. 7

Causes of a vitamin D3 deficit

The most important cause of a vitamin D3 deficiency is reduced exposure to sunlight. If the transmission of UV radiation is impaired, then the cutaneous synthesis of vitamin D3 is reduced *(Fig. 8)*.

Melanin absorbs UV radiation extremely efficiently. Increased skin pigmentation therefore significantly reduces vitamin D3 synthesis.[7] The effect of suntan lotion is comparable. A sun protection factor of 15 absorbs 99 % of the UV radiation and therefore also reduces vitamin D3 synthesis of the skin by 99 %.[7]

Also the angle at which the sun strikes the earth has a large impact. The vitamin D3 synthesis is therefore massively reduced during the wintertime or early mornings or late afternoons.[7]

Clothing also contributes to the absorption of UV radiation. The more skin that is covered by clothing, the longer vitamin D3 synthesis takes. Therefore in regions with the highest solar radiation, vitamin D3 deficiency is broadly distributed (Arabian peninsula).

The absorption of UV radiation reduces the cutaneous synthesis of vitamin D3

Age also plays a role: with increasing age the concentration of the vitamin D3 precursor 7-dehydrocholesterol in the skin is reduced by 25 %.[6] The capacity of the skin to form vitamin D3 then declines by 75 %.

Vitamin D3 is fat-soluble and is rapidly absorbed by fat cells. Adiposity is therefore also associated with a vitamin D3 deficiency.[7] Different medications can also lead to a vitamin D3 deficiency, such as medications against seizures and glucocorticoids.

Causes of a vitamin D3 deficiency

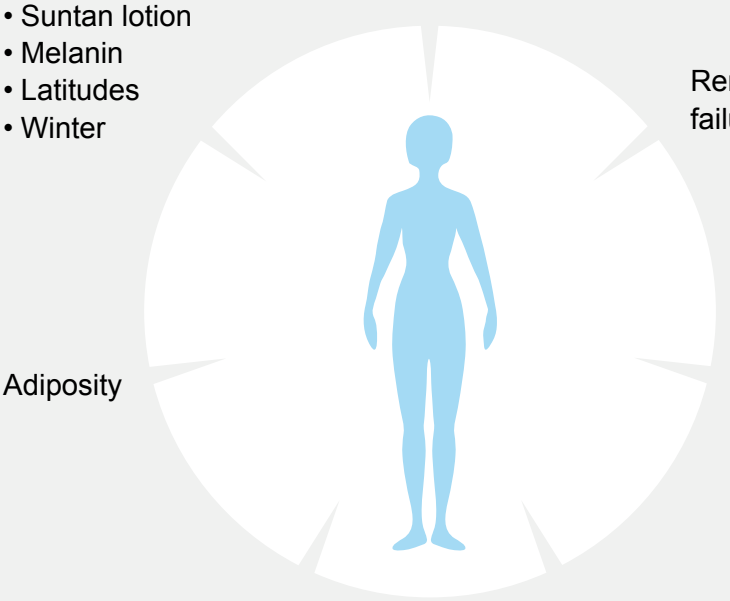


Fig. 8

Vitamin D3 deficiency or skin cancer?

An increase of vitamin D3 formation by extended sun baths can only be recommended to a restricted degree, since sunburns should be avoided due to the danger of skin cancer. The use of suntan lotion has the side effect that only little vitamin D3 is formed since suntan lotions also block UV radiation. A sun protection factor of 15 absorbs 99 % of the UV radiation and thus also reduces vitamin D3 synthesis of the skin by 99 %.[7] A randomized clinical study supports this data.[8] Therefore Vitamin D3 supplementation can be advisable.

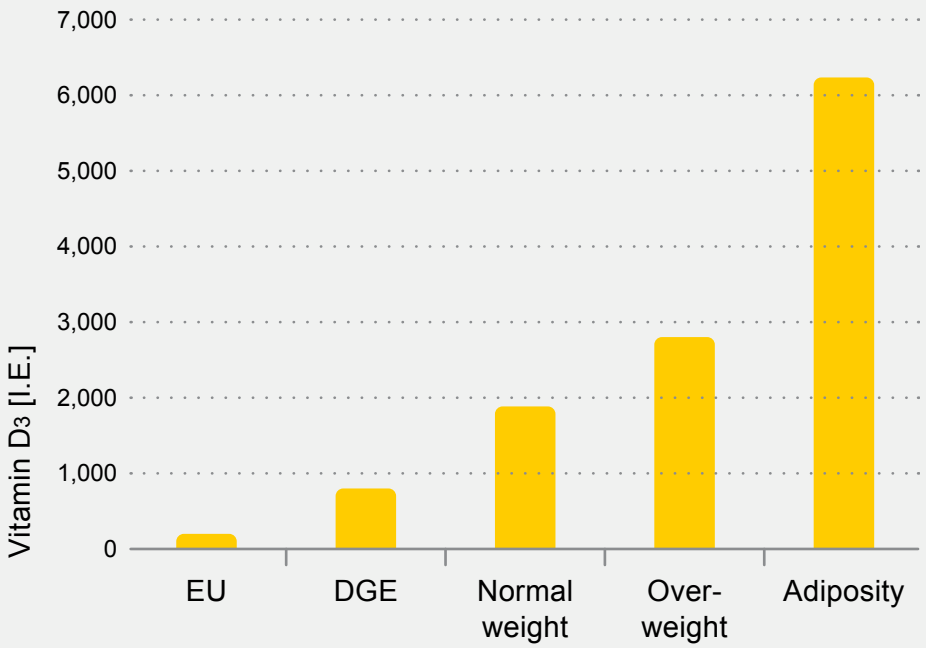
Optimal vitamin D3 supplementation

The question about what the optimal vitamin D3 supplementation in the general population should be centers around minimizing the risk of too low or too high 25-hydroxy vitamin D3 concentrations. This is crucial for the definition of the so-called RDA (Recommended Dietary Allowance). The RDA is the daily nutrient quantity needed to cover the requirements of 97.5 % of the population.

A 2015 study came to the following result.[9] A 25-hydroxy vitamin D3 concentration of 20 ng/mL in 97.5 % of the healthy population requires a daily intake of 2,909 I.E. or 72.7 µg vitamin D3. People with impaired vitamin D3 status require at least 3,279 I.E. (82.0 µg) per day.

In order to achieve an optimal distribution of the 25-hydroxy vitamin D3 concentration, i.e. with the smallest risk of too high or too low values, the daily supplementation of 1,885 I.E. vitamin D3 (47.1 µg) for those of normal weight is recommended.[9] Because of the large impact of body weight, the daily supplementation for overweight people rose to 2,802 I.E. (70.1 µg) and for obese people to even 6,235 I.E. (155.9 µg) vitamin D3 *(Fig. 9)*.

Optimal daily vitamin D3 supplementation



Veugelers PJ, Pham TM, Ekwaru JP. Nutrients. 2015 Dec 4; 7(12): 10189-208. doi: 10.3390/nu7125527. Optimal Vitamin D Supplementation Doses that Minimize the Risk for Both Low and High Serum 25-Hydroxyvitamin D Concentrations in the General Population.

Fig. 9

Overdose with vitamin D3 unlikely

An overdose with vitamin D3 need not be feared since the active form is manufactured in the kidney as required and the rest is eliminated by the body in the inactive form.

For older people, the danger of an overdose is particularly low since vitamin D3 formation declines over the years.

Chemotherapy significantly worsens the vitamin D3 status

A French study showed that 79.5 % of breast cancer patients had a vitamin D3 deficiency of (< 30 ng/mL).[10] It was 97.4 % ($p < 0.0001$) after chemotherapy. A study with colorectal cancer patients showed similar results.[11] While only 17 % of the participants without chemotherapy showed massive vitamin D3 deficiency, the portion of patients with chemotherapy rose to 39 %. Chemotherapy was thereby connected with a 3.2-fold greater risk of showing very low vitamin D3 status ($p < 0.0001$).

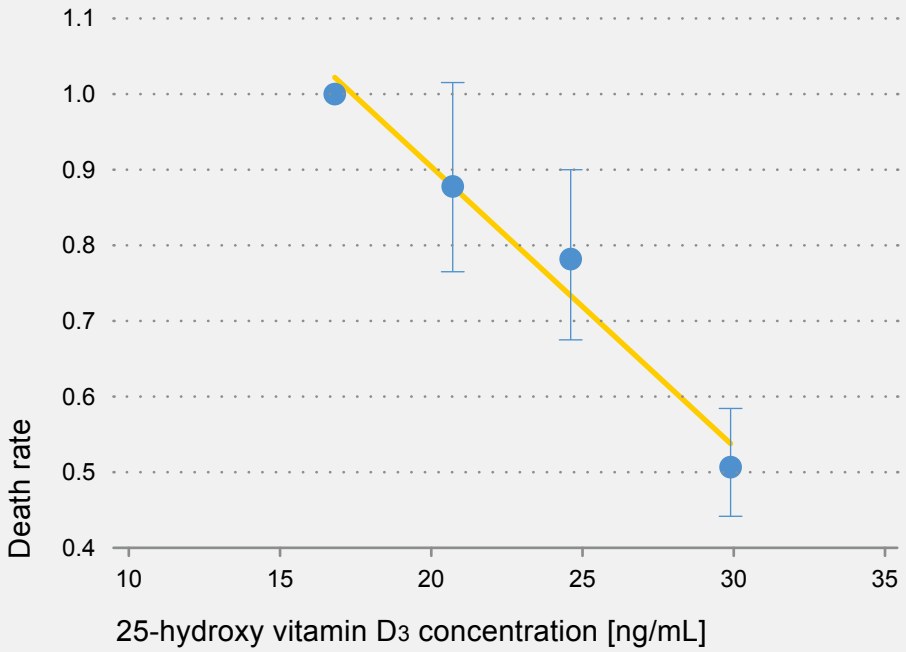
Lower vitamin D3 status worsens the survival probability of cancer patients

Does a vitamin D3 deficiency influence the survival probability of cancer patients?

Both for breast cancer as well as colorectal cancer, the answer to the question provided by the respective meta-analyses is yes.[12, 13] For breast cancer, the death rate in the group with the highest vitamin D3 status was almost half again lower compared with the lowest 25-hydroxy vitamin D3 concentrations (0.56; 95 % CI 0.4 – 0.7; $p < 0.0001$). In addition, a strong, linear dose-response relationship could be shown *(Fig. 10)*.

Also for colorectal cancer patients, a higher 25-hydroxy vitamin D3 concentration was associated with a lower death rate. For patients with a high vitamin D3 status, the mortality was reduced by 37 % compared to those with a low vitamin D3 status (HR 0.63; 95 % CI 0.5 – 0.8; $p < 0.0001$).[13]

Dose-response relationship between vitamin D3 status and death rate for breast cancer



Mohr SB, Gorham ED, Kim J, Hofflich H, Garland CF. Anticancer Res. 2014 Mar; 34(3): 1163-6. Meta-analysis of vitamin D sufficiency for improving survival of patients with breast cancer.

Fig. 10

A prospective analysis of two different studies with regard to follicular lymphoma investigated the relationship between vitamin D3 status and progression-free survival time or total survival.[14] Lower vitamin D3 status in the diagnosis was also associated in both cohorts (SWOG and LYSA) with an inferior outcome, although both cohorts showed a different vitamin D3 distribution. The lower vitamin D3 level complied with several European studies.[14]

Vitamin D3 supplementation based on RDA (400 I.E.) is not sufficient

In a study with breast cancer patients who had undergone adjuvant chemotherapy, the patients received supplements of 400 I.E. (RDA USA and EU) for one year.[15] At the beginning of the study, 74 % of the women showed a vitamin D3 deficiency (median 17 ng/mL). After six months, 65 % of the participants were deficient (median 18 ng/mL), and after one year 60 % (median 19 ng/mL). After one year, less than 15 % of the women achieved sufficient vitamin D3 status.

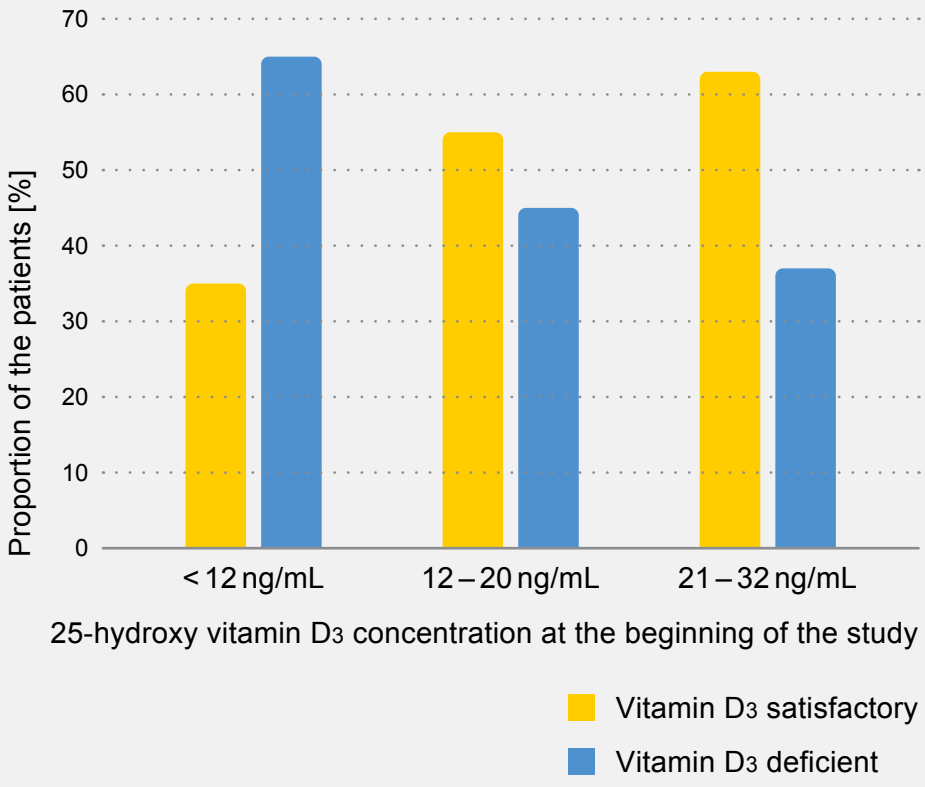
The study significantly showed that the previous RDA does not suffice to also increase the 25-hydroxy vitamin D3 concentration to greater than 30 ng/mL in breast cancer patients.

Only high-dose vitamin D3 supplementation increases the vitamin D3 status

2,198 cancer patients with different cancer types took part in a retrospective study.[16] Participants with a vitamin D3 status ≤ 32 ng/mL (n = 1,651) were supplemented with 8,000 I.E. vitamin D3. The mean 25-hydroxy vitamin D3 concentration was 19.1 ± 7.5 ng/mL at the beginning of the study. In the first follow-up, the vitamin D3 status rose significantly to 36.2 ± 17.1 ng/mL ($p < 0.001$).

Patients with a 25-hydroxy vitamin D3 concentration between 21 ng/mL and 32 ng/mL were most likely to achieve an adequate vitamin D3 status. 8,000 I.E. vitamin D3 daily was also not sufficient for 65 % of the patients with a vitamin D3 level below 12 ng/mL were *(Fig. 11)*.[16] The data also show that a low vitamin D3 initial value requires even higher doses in order to achieve an adequate vitamin D3 status. No adverse reactions due to the supplementation with vitamin D3 could be determined in the study. According to the authors, a dose of 8,000 I.E. for eight weeks is safe.

8,000 I.E. vitamin D3 daily are also not sufficient for low starting values



Vashi PG, Trukova K, Lammersfeld CA, Braun DP, Gupta D. Nutr J. 2010 Nov 23; 9: 60. doi: 10.1186/1475-2891-9-60. Impact of oral vitamin D supplementation on serum 25-hydroxyvitamin D levels in oncology.

Fig. 11

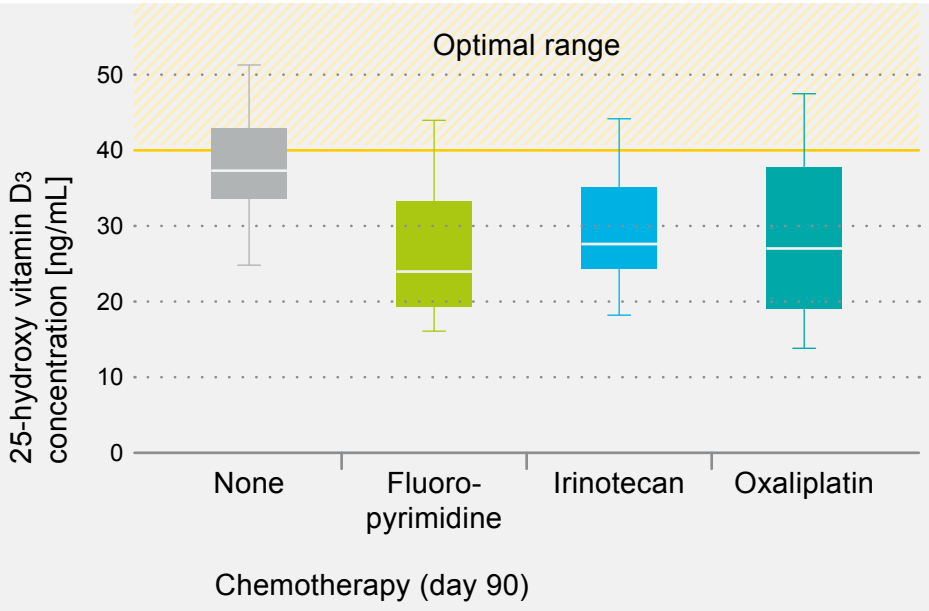

C Michaels

Chemotherapy weakens the effect of vitamin D3 supplementation

In a prospective study, 50 patients with colorectal carcinoma were daily treated with 2,000 I.E. vitamin D3 for six months.[17] At the beginning of the study, the mean 25-hydroxy vitamin D3 concentration was also 17.5 ng/mL. After three months, the vitamin D3 status increased on the average by 14.1 ng/mL to 31.6 ng/mL. After nine months, a similar pattern could be shown with a mean value of 33.8 ng/mL. Also the proportion of patients who after three or nine months respectively achieved an adequate vitamin D3 status (≥ 32 ng/mL) was comparable with 52 % respectively 54 %.

However, chemotherapy made a significant difference ($p < 0.01$).[17] Patients who had chemotherapy showed a mean 25-hydroxy vitamin D3 concentration of 28.7 ± 10.3 ng/mL. The mean value of patients without chemotherapy was 39.0 ± 7.9 ng/mL. Chemotherapy hence significantly weakens the effect of vitamin D3 supplementation – independent of the type of chemotherapy used *(Fig. 12)*. This must also be taken into account for vitamin D3 therapy of cancer patients.

Chemotherapy weakens the effect of a vitamin D3 supplementation



Fakih MG, Andrews C, McMahon J, Muindi JR. Anticancer Res. 2012 Apr; 32(4): 1333-8. A prospective clinical trial of cholecalciferol 2000 IU/day in colorectal cancer patients: evidence of a chemotherapy-response interaction.

Fig. 12

Vitamin D3 supplementation improves the clinical result of breast cancer

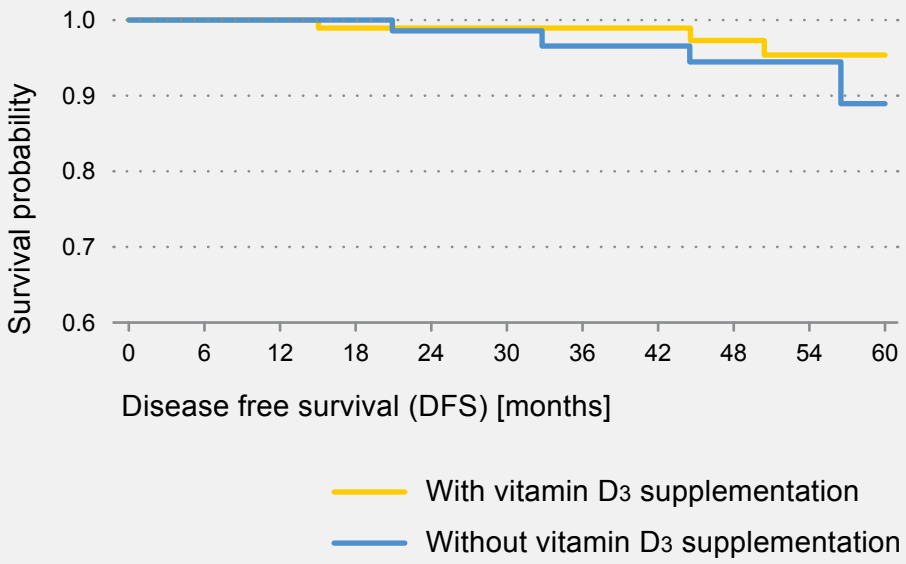
308 patients with HER2+ non-metastatic breast cancer were investigated in a retrospective study.[18] 134 participants received vitamin D3 supplementation during adjuvant chemotherapy, 112 women did not. At the beginning of the study, 33.3 % showed a vitamin D3 deficiency (< 20 ng/mL). The mean 25-hydroxy vitamin D3 concentration at the beginning of the study was 38.7 ± 14.9 ng/mL, and after supplementation at 42.5 ± 13.4 ng/mL. 60 % of the vitamin D3 group took a dose of less than 10,000 I.E. per week.

The median follow-up was 29.5 months. The disease free survival (DFS) time was significantly longer in the group supplemented with vitamin D3 (32.6 vs. 25.5 months; p = 0.022).[18] The difference in the five-year DFS was 69.2 % in the intervention group and 48.3 % in the control group. After the analysis with the final multivariate model, the vitamin D3 supplementation was associated with an improved DFS (HR 0.36; 95 % CI 0.15 – 0.88; p = 0.026) and the tumor size with an inferior DFS (HR 3.52; 95 % CI 1.06 – 11.66; p = 0.04). The vitamin D3 supplementation for breast cancer hence had a significant positive impact on the clinical result *(Fig. 13)*.

Interactions of vitamin D3 with medication for cancer patients

In a systematic review, possible interactions were investigated between a vitamin D3 supplementation and medications used during cancer therapy.[19] In total, neither positive nor negative interactions could be detected. No unusual adverse reactions occurred in cancer patients apart from the effects of high vitamin D3 supplementation to be expected (e.g. hypercalcemia). However this review also showed that chemotherapeutics reduced the 25-hydroxy vitamin D3 concentration.[19] Therefore the authors recommend the examination of the vitamin D3 status during chemotherapy and to supplement with vitamin D3 as needed.

Vitamin D3 supplementation also improves the clinical result of breast cancer



Zeichner SB, Koru-Sengul T, Shah N, Liu Q, Markward NJ, Montero AJ, Glück S, Silva O, Ahn ER. Clin Breast Cancer. 2015 Feb; 15(1): e1-11. doi: 10.1016/j.clbc.2014.08.001. Improved clinical outcomes associated with vitamin D supplementation during adjuvant chemotherapy in patients with HER2+ nonmetastatic breast cancer.

Fig. 13

Dosing of vitamin D3 for cancer patients

Vashi et al. could show that 8,000 I.E. vitamin D3 daily for cancer patients is safe, and for values below 20 ng/mL (vitamin D3 deficit), more than half of the cancer patients achieved an adequate vitamin D3 status.[16] For a 25-hydroxy vitamin D3 concentration below 12 ng/mL are 8,000 I.E. per day was only sufficient for one third of the patients.

No negative effects for 40,000 I.E. daily

In a double-blind randomized clinical study, 66 prostate carcinoma patients were supplemented with different doses of vitamin D3 per day: 400 I.E., 10,000 I.E. or 40,000 I.E.[20] The mean supplementation time period was 33.6 ± 9.5 days.

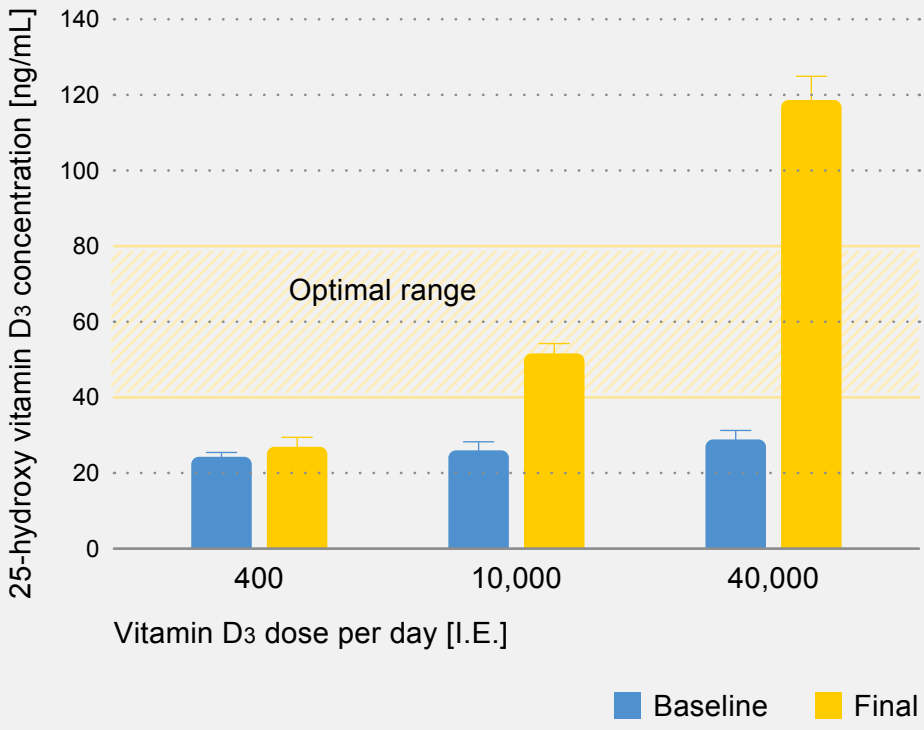
All reported adverse reactions were classified as degree 1 (mild) and were uniformly distributed in all three dosing groups and were classified as independent of the intervention. The plasma calcium concentration did not significantly change during the study and remained within the normal reference range. No cases of hypercalcemia or hypercalciuria occurred.

Short-term, high-dose vitamin D3 therapy, followed by regular intake

If there is a vitamin D3 deficiency, then a vitamin D3 total dose of at least 600,000 I.E. is necessary in order to achieve an adequate vitamin D3 status.[25] This can occur using different dosing schemes: either 50,000 I.E. per week for 12 weeks or 50,000 I.E. three times per week over six weeks.[25]

Intermittent doses of 100,000 I.E. (weekly, monthly, quarterly) were not associated with negative effects in studies.[26] One-time megadoses of 300,000 I.E. to 500,000 I.E. were in fact well tolerated, but were connected with an increased risk of fractures.[26]

Dose-dependent increase of the 25-hydroxy vitamin D3 concentration



Wagner D, Trudel D, Van der Kwast T, Nonn L, Giangreco AA, Li D, Dias A, Cardoza M, Laszlo S, Hersey K, Klotz L, Finelli A, Fleshner N, Vieth R. J Clin Endocrinol Metab. 2013 Apr; 98(4): 1498-507. doi: 10.1210/jc.2012-4019. Randomized clinical trial of vitamin D3 doses on prostatic vitamin D metabolite levels and ki67 labeling in prostate cancer patients.

Fig. 14

This viewpoint is also to be considered for the dosage recommendation for cancer patients with a vitamin D3 deficiency of Gröber et al.[27] A short-term and high-dose vitamin D3 therapy is recommended, connected with periodic intake. The initial vitamin D3 dose (iVD) is calculated as follows: iVD = 40 (150 – actual value [nmol/l]) × body weight [kg]

For a 25-hydroxy vitamin D3 concentration of 10 ng/mL (= 25 nmol/l) and a body weight of 70 kg, the iVD would be 350,000 I.E. vitamin D3. The iVD should be distributed over 7 to 10 days. In this example, the 50,000 I.E. vitamin D3 was for 7 days, followed by a daily intake of 4,000 I.E. to 8,000 I.E. during the cancer therapy.[16] After eight weeks, an examination of the vitamin D3 status is recommended.

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biosyn Arzneimittel GmbH
Schorndorfer Straße 32
70734 Fellbach, Germany
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