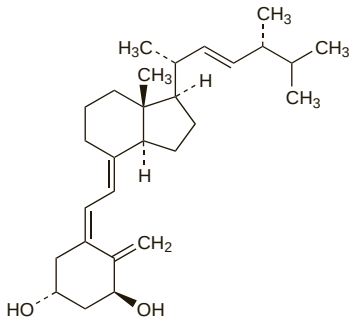
Doxercalciferol *(USAN, rINN)*

Doxercalciférol; Doxercalciferolum; 1α-Hydroxyergocalciferol; 1α-Hydroxyvitamin D_2; 1α-OH-D_2. (5*Z*,7*E*,22*E*)-9,10-Secoergosta-5,7,10(19),22-tetraene-1α,3β-diol.

Доксэркальциферол

$C_{28}H_{44}O_2$ = 412.6.

CAS — 54573-75-0.



Ergocalciferol *(BAN, rINN)*

Calciferol; Ergocalciférol; Ergocalciferolum; Ergokalciferol; Ergokalciferolis; Ergokalsiferol; Ergokalsiferoli; Irradiated Ergosterol; Viosterol; Vitamin D_2. (5*Z*,7*E*,22*E*)-9,10-Secoergosta-5,7,10(19),22-tetraen-3β-ol.

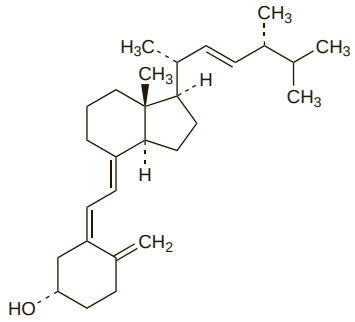
Эргокальциферол

$C_{28}H_{44}O$ = 396.6.

CAS — 50-14-6.

ATC — A11CC01.

ATC Vet — QA11CC01.



Description. Ergocalciferol is an antirachitic substance obtained from ergosterol, a sterol present in fungi and yeasts, by ultraviolet irradiation.

Pharmacopoeias. In *Chin., Eur.* (see p.vii), *Int., Jpn, US*, and *Viet.*

Ph. Eur. 6.2 (Ergocalciferol). White or almost white, crystals or white or slightly yellowish crystalline powder. It is sensitive to air, heat, and light. Practically insoluble in water; freely soluble in alcohol; soluble in fatty oils. Solutions in volatile solvents are unstable and should be used immediately. A reversible isomerisation to pre-ergocalciferol takes place in solution, depending on temperature and time. The activity is due to both compounds. Store under nitrogen in airtight containers at a temperature of 2° to 8°. The contents of an opened container should be used immediately. Protect from light.

The BP 2008 directs that when calciferol or vitamin D is prescribed or demanded, Ergocalciferol or Colecalciferol shall be dispensed or supplied.

USP 31 (Ergocalciferol). White, odourless crystals. It is affected by air and light. Insoluble in water; soluble in alcohol, in chloroform, in ether, and in fatty oils. Store in hermetically sealed containers under nitrogen at a temperature of 8° to 15°. Protect from light.

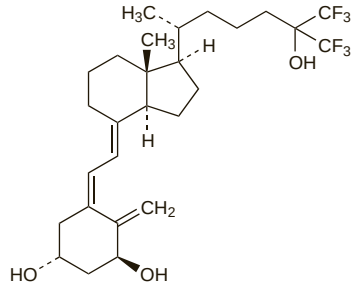
Falecalcitriol *(rINN)*

Falécalcitriol; Falecalcitriolum; Flocalcitriol; Hexafluorocalcitriol; Ro-23-4194; ST-630. (+)-(5*Z*,7*E*)-26,26,26,27,27,27-Hexafluoro-9,10-secocholesta-5,7,10(19)-triene-1α,3β,25-triol.

Фалекальцитриол

$C_{27}H_{38}F_6O_3$ = 524.6.

CAS — 83805-11-2.



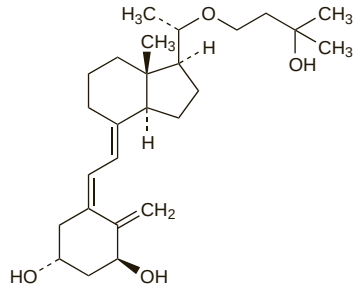
Maxacalcitol *(USAN, rINN)*

1α,25-Dihydroxy-22-oxavitamin D_3; Maxacalcitolum; OCT; 22-Oxacalcitriol; Sch-209579. (+)-(5*Z*,7*E*,20*S*)-20-(3-Hydroxy-3-methylbutoxy)-9,10-secopregna-5,7,10(19)-triene-1α,3β-diol.

Максакальцитол

$C_{26}H_{42}O_4$ = 418.6.

CAS — 103909-75-7.



Paricalcitol *(USAN, rINN)*

ABT-358; Compound 49510; Paracalcin; Paricalcitolum. (7*E*,-22*E*)-19-Nor-9,10-secoergosta-5,7,22-triene-1α,3β,25-triol.

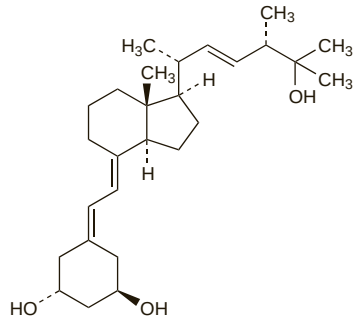
Парикальцитол

$C_{27}H_{44}O_3$ = 416.6.

CAS — 131918-61-1.

ATC — A11CC07.

ATC Vet — QA11CC07.



Pharmacopoeias. In *US.*

USP 31 (Paricalcitol). A white to almost white powder. Insoluble in water; soluble in alcohol. Store under argon in airtight containers at a temperature of –25° to –10°.

Units

The Second International Standard Preparation (1949) of vitamin D consisted of bottles containing about 6 g of a solution of colecalciferol in vegetable oil (1000 units/g). This standard has now been discontinued.

NOTE. Pharmacopoeias consider that one unit of vitamin D is contained in 25 nanograms of colecalciferol or ergocalciferol (i.e. 1 mg of colecalciferol or ergocalciferol is equivalent to 40 000 units of vitamin D as determined by bioassay in *rats*), but see below.

Equivalence. It has been proposed that units of vitamin D be defined in moles or molecules rather than weight terms; in which case, 1 unit of colecalciferol and ergocalciferol would be equivalent to 25 nanograms and 25.78 nanograms, respectively. This inequivalence in units might confound optimal vitamin D dosing recommendations.[1] For the view that colecalciferol is more potent than ergocalciferol, and should be preferred for vitamin D supplementation, see Administration, below.

1. Houghton LA, Vieth R. The case against ergocalciferol (vitamin D) as a vitamin supplement. *Am J Clin Nutr* 2006; **84:** 694–7.

Adverse Effects and Treatment

Excessive intake of vitamin D leads to the development of hyperphosphataemia or hypercalcaemia. Associated effects of hypercalcaemia include hypercalciuria, ectopic calcification, and renal and cardiovascular damage (for a discussion of vitamin-D mediated hypercalcaemia and its treatment, see p.1668). Symptoms of overdosage include anorexia, lassitude, nausea and vomiting, constipation or diarrhoea, polyuria, nocturia, sweating, headache, thirst, somnolence, and vertigo. Interindividual tolerance to vitamin D varies considerably; infants and children are generally more susceptible to its toxic effects. The vitamin should be withdrawn if toxicity occurs. It has been stated that vitamin D dietary supplementation may be detrimental in persons already receiving an adequate intake through diet and exposure to sunlight, since the difference between therapeutic and toxic concentrations is relatively small.

The most potent forms of vitamin D, such as alfacalcidol and calcitriol, might reasonably be expected to pose a greater risk of toxicity; however, their effects are reversed rapidly on withdrawal.

Hypersensitivity reactions have occurred. Skin irritation or contact dermatitis has been reported with topical preparations.

Hypercalcaemia. Vitamin D is the most likely of all vitamins to cause overt toxicity. Doses of 60 000 units daily can cause hypercalcaemia (p.1668), with muscle weakness, apathy, headache, anorexia, nausea and vomiting, bone pain, ectopic calcification, proteinuria, hypertension, and cardiac arrhythmias. Chronic hypercalcaemia can lead to generalised vascular calcification, nephrocalcinosis, and rapid deterioration of renal function.[1,2] A number of reports of accidental overdosage, leading to hypercalcaemia or nephrocalcinosis, occurred in the UK after introduction of a concentrated alfacalcidol oral solution that was 10 times stronger than the former presentation.[3]

Hypercalcaemia has been reported in a patient after brief industrial exposure to colecalciferol.[4]

A study in children treated for renal osteodystrophy has provided some evidence that hypercalcaemia may occur more frequently with calcitriol than with ergocalciferol.[5] Another such study has suggested that vitamin D has nephrotoxic properties independent of the degree of induced hypercalcaemia, and that the decline in renal function may be more marked with calcitriol.[6]

Topical calcitriol may affect calcium homoeostasis, and hypercalcaemia has been reported in some studies.[7] For reference to the effect of other vitamin D analogues used in psoriasis on calcium homoeostasis, see p.1591.

1. Anonymous. Toxic effects of vitamin overdosage. *Med Lett Drugs Ther* 1984; **26:** 73–4.
2. Chiricone D, *et al.* Unusual cases of chronic intoxication by vitamin D. *J Nephrol* 2003; **16:** 917–21.
3. Committee on Safety of Medicines/Medicines Control Agency. Accidental overdose with alfacalcidol (One-Alpha drops). *Current Problems* 2001; **27:** 3. Also available at: http://www.mhra.gov.uk/home/idcplg?IdcService=GET_FILE&dDocName=CON007458&RevisionSelectionMethod=LatestReleased (accessed 09/01/06)
4. Jibani M, Hodges NH. Prolonged hypercalcaemia after industrial exposure to vitamin D . *BMJ* 1985; **290:** 748–9.
5. Hodson EM, *et al.* Treatment of childhood renal osteodystrophy with calcitriol or ergocalciferol. *Clin Nephrol* 1985; **24:** 192–200.
6. Chan JCM, *et al.* A prospective, double-blind study of growth failure in children with chronic renal insufficiency and the effectiveness of treatment with calcitriol versus dihydrotachysterol. *J Pediatr* 1994; **124:** 520–8.
7. Bourke JF, *et al.* Vitamin D analogues in psoriasis: effects on systemic calcium homeostasis. *Br J Dermatol* 1996; **135:** 347–54.

Precautions

Vitamin D should not be given to patients with hypercalcaemia. It should be used with caution in infants, who may have increased sensitivity to its effects, and patients with renal impairment or calculi, or heart disease, who might be at increased risk of organ damage if hypercalcaemia occurred. Plasma phosphate concentrations should be controlled during vitamin D therapy to reduce the risk of ectopic calcification.

It is advised that patients receiving pharmacological doses of vitamin D should have their plasma-calcium concentration monitored at regular intervals, especially