Betamethasone Valerate *(BANM, USAN, rINNM)* ⊗

Beetametasonivaleraatti; Betametasonvalerat; Betametazon Valerat; Betametazono valeratas; Betametazonu walerianian; Betametazon-valerát; Bétaméthasone, valérate de; Betamethasoni valeras; Betamethason-valerát; Valerato de betametasona. Betamethasone 17α-valerate.

Бетаметазона Валерат

$C_{27}H_{37}FO_6$ = 476.6.

CAS — 2152-44-5.

ATC — A07EA04; C05AA05; D07AC01; H02AB01; R01AD06; R03BA04; S01BA06; S02BA07; S03BA03.

ATC Vet — QA07EA04; QC05AA05; QD07AC01; QH02AB01; QR01AD06; QR03BA04; QS01BA06; QS02BA07; QS03BA03.

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

Ph. Eur. 6.2 (Betamethasone Valerate). A white or almost white, crystalline powder. Practically insoluble in water; soluble in alcohol; freely soluble in acetone and in dichloromethane. Protect from light.

USP 31 (Betamethasone Valerate). A white to practically white, odourless, powder. Practically insoluble in water; soluble 1 in 16 of alcohol, 1 in less than 10 of chloroform, and 1 in 400 of ether; freely soluble in acetone; slightly soluble in benzene. Store in airtight containers.

Adverse Effects, Treatment, Withdrawal, and Precautions

As for corticosteroids in general (see p.1490).

Betamethasone has little or no effect on sodium and water retention.

When applied topically, particularly to large areas, when the skin is broken, or under occlusive dressings, or when given intranasally, corticosteroids may be absorbed in sufficient amounts to cause systemic effects. Prolonged use of ophthalmic preparations containing corticosteroids has caused raised intra-ocular pressure and reduced visual function.

Anosmia. Complete anosmia was reported in 2 patients after the use of nasal drops containing betamethasone and neomycin sulfate[1] and, in one patient, showed no sign of resolving 1 year later. The reaction was thought to be due to the preservative thiomersal present in the drops, although it was noted that neomycin could exert a toxic effect on the olfactory mucosa and that there have been several reports of anosmia associated with the use of betamethasone alone.

1. Whittet HB, *et al.* Anosmia due to nasal administration of corticosteroid. *BMJ* 1991; **303:** 651.

Interactions

The interactions of corticosteroids in general are described on p.1494.

Pharmacokinetics

For a brief outline of the pharmacokinetics of corticosteroids, see p.1495. Betamethasone crosses the placenta.

Uses and Administration

Betamethasone is a corticosteroid with mainly glucocorticoid activity (p.1490); the anti-inflammatory activity of 750 micrograms of betamethasone is equivalent to about 5 mg of prednisolone. It has been used, either in the form of the free alcohol or in one of the esterified forms, in the treatment of conditions for which corticosteroid therapy is indicated (p.1495), except adrenal-deficiency states for which hydrocortisone with supplementary fludrocortisone is preferred. Its virtual lack of mineralocorticoid properties makes betamethasone particularly suitable for treating conditions in which water retention would be a disadvantage.

The dose is usually expressed in terms of the base, and the following are each equivalent to about 1 mg of betamethasone:

- betamethasone acetate 1.1 mg
- betamethasone benzoate 1.3 mg
- betamethasone dipropionate 1.3 mg
- betamethasone sodium phosphate 1.3 mg
- betamethasone valerate 1.2 mg

When given orally betamethasone or betamethasone sodium phosphate are used; the usual dose, expressed in terms of betamethasone, ranges from 0.5 to 5 mg daily.

For parenteral use the sodium phosphate ester may be given intravenously by injection or infusion or intramuscularly by injection in doses equivalent to 4 to 20 mg of betamethasone. It may also be given by local injection into soft tissues in doses equivalent to 4 to 8 mg of betamethasone. Doses in children, as a slow intravenous injection, are:

- infants aged up to 1 year: the equivalent of 1 mg of betamethasone
- 1 to 5 years: 2 mg
- 6 to 12 years: 4 mg

Doses may be repeated 3 or 4 times in 24 hours if necessary, depending on the condition being treated and the clinical response. The sodium phosphate ester is also sometimes used with the acetate or dipropionate esters, which have a slower and more prolonged action.

Betamethasone sodium phosphate is also used in the topical treatment of allergic and inflammatory conditions of the eyes, ears, or nose, usually as drops or ointment containing 0.1%.

For topical application in the treatment of various skin disorders the dipropionate and valerate esters of betamethasone are extensively used; the usual concentrations available are the equivalent of 0.05% of betamethasone as the dipropionate, and 0.025 or 0.1% as the valerate. For recommendations concerning the correct use of corticosteroids on the skin, and a rough guide to the clinical potencies of topical corticosteroids, see p.1497.

Betamethasone valerate has also been used by inhalation for the prophylaxis of asthma.

Other esters of betamethasone which have occasionally been used include the benzoate, butyrate propionate, phosphate, salicylate (cortobenzolone), and valeroacetate.

Betamethasone adamantoate has been used in veterinary practice.

Haemangioma. For reference to the use of a mixture of betamethasone and triamcinolone for the intralesional injection of haemangiomas, see p.1505.

Inflammatory bowel disease. For a comparison of betamethasone and beclometasone enemas in the treatment of ulcerative colitis, see under Beclometasone, p.1518. Corticosteroids are one of the mainstays of treatment of inflammatory bowel disease, the general management of which is discussed on p.1697.

Neonatal respiratory distress syndrome. For a discussion on the antenatal use of betamethasone to prevent neonatal respiratory distress syndrome, see p.1508.

Preparations

BP 2008: Betamethasone and Clioquinol Cream; Betamethasone and Clioquinol Ointment; Betamethasone Eye Drops; Betamethasone Injection; Betamethasone Sodium Phosphate Tablets; Betamethasone Tablets; Betamethasone Valerate Cream; Betamethasone Valerate Lotion; Betamethasone Valerate Ointment; Betamethasone Valerate Scalp Application;

USP 31: Betamethasone Benzoate Gel; Betamethasone Cream; Betamethasone Dipropionate Cream; Betamethasone Dipropionate Lotion; Betamethasone Dipropionate Ointment; Betamethasone Dipropionate Topical Aerosol; Betamethasone Sodium Phosphate and Betamethasone Acetate Injectable Suspension; Betamethasone Sodium Phosphate Injection; Betamethasone Syrup; Betamethasone Tablets; Betamethasone Valerate Cream; Betamethasone Valerate Lotion; Betamethasone Valerate Ointment; Clotrimazole and Betamethasone Dipropionate Cream.

Proprietary Preparations (details are given in Part 3)

Arg.: Beta Adenil†; Betacort; Betasone-G; Betasone-G 12 Horas; Betatopic; Betnovate; Betnovate Capilar; Blacor; Butasona; Butasona RL; Celestone; Celestone Cronodose; Cevicort; Cevicort NC; Coid; Corteroid; Corteroid Retard; Cortiderma; Cortimar; Cronocorteroid; Cronolevel; Deltalaf; Dermizol; Difenac Forte; Diprocel†; Diprosone; Lazar-Cort; Maxisona†; Metamar; Micosep B; Quiacort; Transderma B; Valederm; ***Austral.:*** Antroquoril; Betnovate; Celestone Chronodose; Celestone M; Celestone V†; Cortival; Diprosone; Eleuphrat; ***Austria:*** Betnesol; Betnovate; Celestan; Diproderm; Diproforte; Diprophos; Solu-Celestan; ***Belg.:*** Betnelan-V; Celestone; Celestone Chronodose; Diprolene; Diprosone; ***Braz.:*** Alersan†; Beclonato; Benevat; Beta Long; Betaderm; Betametagen; Betaprospan; Betaspan; Betatrinta; Betnelan; Betnolon; Betnovate; Betrat B; Betrospam; Betsona; Celestan†; Celestone; Celestone Soluspan; Dermobet†; Dermonil†; Dermoval†; Dermovat†; Dibetam†; Diprobeta; Diprocort; Diprosen; Diprosone; Diprospan; Duoflam; Koide; Sensitex; Valbet; ***Canad.:*** Betaderm; Betaject; Betnesol; Celestoderm†; Celestone Soluspan; Diprolene Glycol; Diprosone; Prevex B; ratio-Ectosone; ratio-Topilene; ratio-Topisone; Taro-Sone; Topisone†; Valisone; ***Chile:*** Betnovate†; Cidoten; Cidoten Rapilento; Cidoten V; Coritex; Cremirit; Cronolevel; Dacam; Dacam RL; Diprolene; Diprospan; Disopranil; Konicortil; Labosona; Oftasona P; Spel; ***Cz.:*** Beloderm; Beta†; Betesil; Betnovate; Celestoderm-V†; Diprophos; Diprosone; Kuterid; ***Denm.:*** Betnovat; Bettamousse; Celeston; Diproderm; Diprolen; Diprospan; ***Fin.:*** Bemetson; Betapred; Betnovat; Bettamousse; Celestoderm; Celeston Chronodose; Diproderm; Diprolen; ***Fr.:*** Betesil; Betnesol; Betneval; Celestene; Celestene Chronodose; Celestoderm; Diprolene; Diprosone; ***Ger.:*** Bemon; Beta-Stulln†; Beta-Wolff†; BetaCreme; Betagalen; Betam-Ophtal†; BetaSalbe; Betnesalic mono; Betnesol; Betnesol-V; Celestamine N; Celestan Depot; Celestan solubile; Celestan-V; Cordes Beta; Deflatop; Diprosis; Diprosone; Diprosone Depot; Linola Cort Beta; Pentacort†; Soderm; ***Gr.:*** Betamatic†; Betnesol; Betnovate; Celestene; Celestoderm-V; Celestone; Celestone Chronodose; Flogozyme; Galinocort; Locason-N; Locason†; Movithiol; Osmoran; Propiochrone; Propioform; Sanorvil; ***Hong Kong:*** Betaderma; Betasone; Betazone; Betnovate; Celestoderm-V†; Celestone†; Derzid; Diprocel; Diprosone; Diprospan; Ectosone†; Synmethasone; ***Hung.:*** Betesil; Celestone†; Diprophos; ***India:*** Betafoam; Betnecip; Betnecort; Betnederm; Betnelan; Betnesol; Betnovate; Topicasone; Valbet; Walacort; ***Indon.:*** Benoson; Betam-Ophtal; Betason; Betnovate; Betodermin; Betopic; Celestoderm-V; Celestone; Corsaderm; Diprosone-OV; Exabet; Mesonta; Metonate; Molason; Oviskin; Proson; Scanderma; Skizon; Vason; ***Irl.:*** Betacap; Betnelan; Betnesol; Betnovate; Bettamousse; Diprosone; ***Israel:*** Betacorten; Betnesol; Betnovate; Bettamousse; Celestone Chronodose; Diprolene; Diprosone; Diprospan; ***Ital.:*** Beben; Bentelan; Beta 21; Betamesol; Betesil; Bettamousse; Celestoderm-V†; Celestone; Celestone Cronodose; Diprosone; Ecoval; ***Malaysia:*** Beavate; Beprogel; Beprosone; Besone; Beta; Betasone; Betnesol†; Betnosone; Betnovate; Bufencon; Celestoderm-V†; Celestone†; Daivobet; Dermasole DP†; Dermasole†; Dibetasol; Diprocel; Diprosone; Diprospan; Setrosone†; Uniflex†; ***Mex.:*** Betnovate; Celestoderm-V†; Celestone; Celestone Soluspan; Cronolevel; Dermoval; Diprofast; Dipronova; Diprosone; Diprospan; Disons Dex; Erispan; Reubaxona; ***Neth.:*** Betnelan; Betnesol; Celestoderm; Celestone; Celestone Chronodose; Diprolene; Diprosone; ***Norw.:*** Betnovat; Bettamousse; Celeston; Diproderm; ***NZ:*** Beta; Betnesol; Betnovate; Bivate; Celestone Chronodose; Diprolene; Diprosone; ***Philipp.:*** Beta; Betnelan; Betnovate; Celestone; Diprolene; Diprosone; Diprospan; Steroderm; ***Pol.:*** Celestone; Diprolene; Diprophos; Diprosone; Kuterid; ***Port.:*** Betnasol; Betnovate; Celesdepot; Celestone; Cilestoderme; Dibetop†; Diprofos; Diprosone; Soluderme; Vabeta; ***Rus.:*** Akriderm (Акридерм); Beloderm (Белодерм); Betasone (Бетазон); Celestoderm-V (Целестодерм-В); Diprospan (Дипроспан); ***S.Afr.:*** Betanoid; Betnesol; Betnovate; Celestoderm-V†; Celestone; Celestone Soluspan; Diprolene†; Diprosone; Lenasone; Lenovate; Persivate; Repivate; Steromien†; Topivate; ***Singapore:*** Beprogel; Beprosone; Besone; Betacorten; Betasone; Betnovate; Camnovate; Celestoderm-V†; Celestone†; Dermasone; Derzid; Dibetasol; Diprocel; Diprosone; Diprospan; Uniflex†; ***Spain:*** Betnovate; Bettamousse; Celestoderm; Celestoderm-V; Celestone; Celestone Cronodose; Diproderm; ***Swed.:*** Betapred; Betnovat; Bettamousse; Celeston; Celeston bifas; Celeston valerat; Diproderm; Diprolen; ***Switz.:*** Betnesol; Betnovate; Celestoderm-V; Celestone; Celestone Chronodose; Diprolene; Diprosone; ***Thai.:*** Bennasone†; Beprogel; Bepronate; Beprosone; Besone; Bessasone; Beta; Betameth; Bethasone; Betnovate; Betosone; Bipro; Clinivate; Derzid; Diprobet†; Diprosone; Diprospan; Diprotop; Polynovate; Prevex B†; Sebo; Valbet; Valerbet†; ***Turk.:*** Betnovate; Celestoderm-V; Celestone Chronodose; Diprolene; Diprospan; Seroderm; ***UAE:*** Betasone; ***UK:*** Betacap; Betnelan; Betnesol; Betnovate; Betnovate RD (Ready Diluted); Bettamousse; Diprosone; Vista-Methasone; ***USA:*** Alphatrex†; Beta-Val; Cel-U-Jec; Celestone; Celestone Soluspan; Diprolene; Diprosone; Luxiq; Maxivate; Teladar†; Valisone; ***Venez.:*** Beprospen; Betacort; Betaderm; Betagen; Betagen Solspen; Betnovate; Celestoderm; Celestone; Celestone Soluspan; Detarmon†; Diprocel; Diprosone; Diprospan; Itisona.

Multi-ingredient: ***Arg.:*** Adenil; Algio Nervomax Fuerte; Antiflogol; Antihemorroidal; Bacticort; Bacticort Complex; Becortin; Betacort Plus; Betametasona B12; Betasalic; Betasone-G Compuesto; Betnovate Antihemorroidal†; Betnovate-C; Betnovate-N; Blamy; Blokium B12; Calmurid; Celestamine; Celestamine-L; Cevaderm; Ciprocort L; Clarityne Cort; Confor-Tar†; Corteroid Gesic; Cortispec; Cortistamin L; Cortistamin NF†; Cuta Crema; Denvercrem; Dermizol G; Dermizol Trio; Dermosona; Dermovit†; Diclogesic Plus B12; Dioxaflex B12; Diprogenta; Diprosalic; Doxtran B12; Drum B; Eubetal Biotic†; Factor Dermico; Fucicort; Fusimed B; Gelbiotic Plus; Gentasol; Hifamonil Crema; Histamino Corteroid L; Ingemet; Lazar-Cort Complex; Lisaler Beta; Lotricomb; Macril; Maxisalic; Mencogrin; Micomazol B; Miklogen; Monizol Cort Crema; Negalerg†; Neo-Mudapenil†; Nularef Cort; Oxa B12; Procto-Metadyne; Quadriderm; Quiacort G; Quiacort G Plus; Rodinac B12; Salicort; Sinaler B; Sirotamicin BG; Sorsis Beta; Toflam; Tribiocort; Triliver; Triplex; Vesalion B12; Virobron B12 NF; Vitacorti; Vixidone LB; Xedenol B12; ***Austral.:*** Celestone VG†; Daivobet; ***Austria:*** Betnesol-N; Betnovate-C; Betnovate-N; Celestamin; Diprogenta; Diprosalic; Fucicort; Psorcutan Beta; ***Belg.:*** Betnelan-VC†; Diprophos; Diprosalic; Dovobet; Fucicort; Garasone†; Lotriderm; ***Braz.:*** Betaderm N; Betazol Cort; Betnovate-N; Betnovate-Q; Candicort; Celerg; Celestamil†; Celestamine; Celestrat; Celetil; Celocort; Cetobeta; Cetocort; Cetocorten; Cimecort; Cremederme; Daivobet; Dermosalic; Dextamine; Dipro AS; Diprogenta; Diprosalic; Emscort; Garasone; Gentacort; Histamed; Koide D; Lestamil; Microbiogen†; Naderm; Novacort; Oto Betnovate; Permut; Polideris; Postec; Quadriderm; Quadrikin; Quadrilon; Quadriplus; Qualiderm; Reumix†; Tetraderm; Trok; Trok-N; Verutex B; ***Canad.:*** Diprogen†; Diprosalic; Dovobet; Garasone; Lotriderm; Pentasone; ratio-Topisalic; Valisone-G; ***Chile:*** B-Laboterol; Betnovate-N†; Cam; Celestamine; Cestop B†; Clofexan; Clotrimin-B; Cobefen; Contralmor; Creminem-B; Deucoaler; Diproquin; Diprosalic; Diprospan G; Donomix; Fucicort; Gentasone; Gotalgic; Labosalic; Labosona G; Labosona N†; Locrim; Lotriderm; Mixgen; Novadrel; Novarnela; Oftagen Compuesto; Oftasona N; Otandrol; Otazol†; Oticum; Otolisan; Plexus; Prodel B; Vilterm†; ***Cz.:*** Belogent; Belosalic; Betabioptal†; Daivobet; Diprosalic; Fucicort; Garasone; Lotriderm†; ***Denm.:*** Betnovat med Chinoform; Betnovat Rektal†; Celeston med Chinoform; Clotrason; Daivobet; Diprosalic; Fucicort; ***Fin.:*** Bemetson-K; Betnovat Comp†; Betnovat-C; Celestoderm cum Chinoform†; Celestoderm cum Garamycin; Daivobet; Diprosalic; Fucicort; ***Fr.:*** Betnesalic†; Betneval-Neomycine†; Celestamine; Daivobet; Diprosalic; Diprosept†; Diprosone Neomycine; Diprostene; ***Ger.:*** Betadermic; Betagentam; Betamethason comp; Betamethason Plus†; Celestamine†; Daivobet; Dermobeta†; Diprogenta; Diprosalic; Fucicort; Lotricomb; Lygal E Tinktur†; Psorcutan Beta; Soderm Plus; Sulmycin mit Celestan-V; Terracortril N; ***Gr.:*** Alpider; Befucil; Betacort; Betafusin; Betasid; Betfu; Betnovate-C; Betnovate-N; Celestoderm-V/GA; Dovobet; Fubecot; Fucicort; Fucicream; Fusibet; Garamat; Propiogenta; Propiosalic; Roseti; Sensibio; Staficort; ***Hong Kong:*** Allersan; Aristobet-N; Bechlomin; Beclomin†; Becogem; Betnesalic†; Betnovate-C†; Betnovate-N; Bonjedex; Celestamine; Celestoderm-V with Garamycin; Clobeta-G; Conazole; Daivobet; Dermafacte; Derzid-C; Derzid-N†; Dexmin†; Dextrosone; Diprogenta; Diprosalic; Fucicort; Garasone; Lozopin; Lycobeta-G; Quadriderm; Synbetamine; Triderm; ***Hung.:*** Daivobet; Diprosalic; Fucicort; Garasone; Gentason; Vipsogal†; ***India:*** Betamil-GM; Betamil-M; Betasalic; Betnederm C; Betnederm GM; Betnederm N; Betnesol-N; Betnesol-N Nasal; Betnor; Betnovate-C; Betnovate-GM; Betnovate-M; Betnovate-N; Betnovate-S; Fourderm; Fourderm AF; Genticyn B Eye/Ear†; Quiss; Supirocin-B; Surfaz-SN; Topicasone with Neomycin; Valbet; ***Indon.:*** Benoson G; Benoson M; Benoson N; Benoson V; Berloson-N; Betagentam; Betasin; Betason-N; Betnovate-N; Bevalex; Biocort; Celestamine; Celestoderm-V with Garamycin; Colergis; Daivobet; Digenta; Diprogenta; Diprosalic; Diprosta; Exabetin; Fucicort; Garasone; Heltiskin; Isotic Betaracin; Krimbeson; Lotriderm; Mastroson; Metaskin-N; Mytaderm; Nilacelin; Ocuson; Polacel; Proson N; Salgen Plus; Scanderma Plus; Skilone; Skinal; Sonigen; Tuderm-N; Zestam; ***Irl.:*** Betnesol-N; Betnovate-C; Betnovate-N; Diprosalic; Dovobet; Fucibet; Lotriderm; ***Israel:*** Betacorten-G; Betnesol-N; Betnovate-C; Betnovate-N; Clotrisone; Daivobet; Diprogenta; Diprosalic; Fucicort; Triderm; ***Ital.:*** Alfaflor; Batasalgin; Beben Clorossina; Betabioptal; Betacream; Betafloroto; Biorinil; Brumeton Colloidale S; Deltavagin; Dermabiolene; Dermatar; Dipro-

form; Diprosalic; Dovobet; Ecoval con Neomicina; Egerian; Eubetal Antibiotico; Fidagenbeta; Fluororinil; Fucicort; Gentalyn Beta; Kamelyn; Micutrin Beta†; Psoninase†; Rinojet†; Sterozinil; Stranoval; Token; Visublefarite; Visumetazone Antibiotico; ***Malaysia:*** Axcel Fusi-Corte; B-Mycin; Beavate N; Beprogent; Beprosalic; Besone-N; Betacin; Betagen; Betamethasone Clo; Betamethasone G; Betamethasone N; Betamethasone SA; Betnesol-N†; Betnosone N; Betnovate-N; Celestoderm-V with Garamycin†; Diprogenta; Diprosalic; Fobancort; Fucicort; Fusidic B; Garasone; Joysun; Triderm-C; Uniflex-N†; ***Mex.:*** Artridol; Barmicil Compuesto; Beclogen; Betrigen; Celestamine NS; Celestamine-F†; Celestamine†; Claricort†; Clio-Betnovate; Clotricina; Daivobet; Diprosalic†; Diprosone G; Diprosone Y; Farmalor; Fucicort; Garamicina-V; Garasone; Gelmicin; Miclobet; Prubagen; Quadriderm NF; Tamex; Triderm; ***Neth.:*** Diprosalic; Dovobet; ***Norw.:*** Betnovat med Chinoform; Daivobet; Diprosalic; ***NZ:*** Betnesol Aqueous; Betnovate-C; Daivobet; Diprosalic†; Fucicort; Lotricomb†; ***Philipp.:*** Betneton; Betnovate-C; Betnovate-N; Celestamine; Claricort; Clotrasone; Daivobet; Diproform; Diprogenta; Diprosalic; Fucicort; Garasone; Hoebedic; Ophtasone; Quadriderm; Quadrotopic; Triderm; ***Pol.:*** Bedicort G; Betnovate-C; Betnovate-N; Daivobet; Diprogenta; Diprosalic; Lotriderm; Triderm; ***Port.:*** Beta-Micoter; Betnovate-C; Betnovate-N; Daivobet; Dibetop Q†; Diprogenta; Diprosalic; Epione; Flotiran; Fucicort; Psodermil; Quadriderme; ***Rus.:*** Akriderm Genta (Акридерм Гента); Akriderm GK (Акридерм ГК); Akriderm SK (Акридерм СК); Belogent (Белогент); Belosalic (Белосалик); Betagenot (Бетагенот); Celestoderm-V with Garamycin (Целестодерм-В с Гарамицином); Daivobet (Дайвобет); Diprosalic (Дипросалик); Fucicort (Фуцикорт); Triderm (Тридерм); ***S.Afr.:*** Betanoid N†; Betnesol-N; Betnovate-C; Betnovate-N; Celestamine; Celestoderm-V with Garamycin†; Diprogenta; Diprosalic; Garasone†; Lotriderm; Quadriderm; ***Singapore:*** B-Tasone-G; Beprogent; Beprosalic; Besone-N; Bufencon; Celestoderm-V with Garamycin†; Celestoderm-V with Neomycin†; Clotrasone†; Combiderm; Conazole; Daivobet; Dermanol-C; Diprogenta; Diprosalic; Fobancort; Fucicort; Garasone; Gentriderm; Gentrisone; Modaderm; Neoderm; Quadriderm†; Tri-Micon; Triderm; ***Spain:*** Alergical; Beta Micoter; Betamida†; Bronsal; Celesemine; Celestoderm Gentamicina; Celestone S; Clotrasone; Cuatroderm; Daivobet; Diprogenta; Diprosalic; Fucibet; Resorborina†; ***Swed.:*** Betnovat med Chinoform; Betnovat med Neomycin; Celeston valerat comp†; Celeston valerat med chinoform; Celeston valerat med gentamicin; Daivobet; Diprosalic; ***Switz.:*** Betnesalic; Betnovate-C; Betnovate-N; Celestamine; Daivobet; Diprogenta; Diprophos; Diprosalic; Fucicort; Ophtasone; Quadriderm; Triderm; ***Thai.:*** Bacda-B; Beprogent; Beprogenta; Beprolic; Besone-N; Beta-C; Beta-Dipo†; Beta-N; Beta-S; Betama-EN†; Betameth-N; Bethasone-N; Betnesalic†; Betnovate-C; Betnovate-N; Betosalic; Betosone-CE; Canasone†; Canazol-BE; Clinivate-N; Clotrasone†; Daivobet; Derzid-C; Derzid-N; Diprogenta†; Diprosalic; Fango-B; Fucicort; Fungiderm-B; Gynesten-B; Myda-B; Myrazole-B; Topaben-N; Twina; Valbet-N; ***Turk.:*** Betnovate-C; ***UAE:*** Futasone; Supraproct-S; ***UK:*** Betnesol-N; Betnovate-C; Betnovate-N; Diprosalic; Dovobet; Fucibet; Vipsogal; Vista-Methasone N; ***USA:*** Lotrisone; Taclonex; ***Venez.:*** Betaderm con Gentamicina; Celestamincort; Celestamine; Celestoderm con Gentalyn; Claricort; Diproformo; Diprogenta; Diprosalic; Garabet; Garasone; Lotricomb; Lotrisone; Propioformo†; Propiogenta†; Propiosalic†; Quadriderm; Triderm; Tridetarmon; Urisalic†; Vio Celestoderm†.

Budesonide *(BAN, USAN, rINN)* ⊗

Budesonid; Budesónida; Budésonide; Budesonidi; Budesonidum; Budezonid; Budezonidas; S-1320. An epimeric mixture of the α- and β-propyl forms of 16α,17α-butylidenedioxy-11β,21-dihydroxypregna-1,4-diene-3,20-dione.

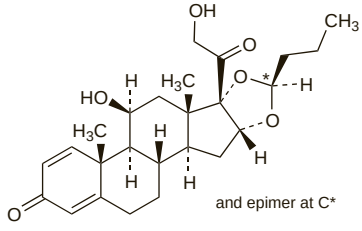
Будезонид

$C_{25}H_{34}O_6$ = 430.5.

CAS — 51333-22-3 (11β,16α); 51372-29-3 (11β,16α(R)); 51372-28-2 (11β,16α(S)).

ATC — A07EA06; D07AC09; H02AB16; R01AD05; R03BA02.

ATC Vet — QA07EA06; QD07AC09; QR01AD05; QR03BA02.



Pharmacopoeias. In *Eur.* (see p.vii) and *US*.

Ph. Eur. 6.2 (Budesonide). A white or almost white, crystalline powder. Practically insoluble in water; sparingly soluble in alcohol; freely soluble in dichloromethane.

USP 31 (Budesonide). A white to off-white, odourless, crystalline powder. Practically insoluble in water and in heptane; sparingly soluble in alcohol; freely soluble in chloroform. Store in airtight containers at a temperature of 20° to 25°, excursions permitted between 15° and 30°. Protect from light.

Adverse Effects, Treatment, Withdrawal, and Precautions

As for corticosteroids in general (see p.1490).

Inhalation of high doses of budesonide is associated with some adrenal suppression. Systemic absorption may follow nasal use, particularly after high doses or prolonged treatment. The dose of oral budesonide may need to be reduced in hepatic impairment (see also Administration in Hepatic Impairment, below).

When applied topically, particularly to large areas, when the skin is broken, or under occlusive dressings, or when given intranasally, corticosteroids may be absorbed in sufficient amounts to cause systemic effects.

Effects on the bones. For mention of the effects of inhaled budesonide on markers of collagen turnover and bone density in asthmatic children, see under Adverse Effects of Beclometasone, p.1516. For the suggestion that inhalation once-daily in the morning may have less marked effects on growth and collagen turnover than twice-daily inhalation, see Administration, below.

Effects on the nervous system. Psychotic behaviour has been reported after use of inhaled budesonide.[1-3]

1. Lewis LD, Cochrane GM. Psychosis in a child inhaling budesonide. *Lancet* 1983; **ii:** 634.
2. Meyboom RHB, de Graff-Breederveld N. Budesonide and psychic side effects. *Ann Intern Med* 1988; **109:** 683.
3. Connett G, Lenney W. Inhaled budesonide and behavioural disturbances. *Lancet* 1991; **338:** 634–5.

Hypersensitivity. Contact dermatitis has been reported to topical or intranasal budesonide.[1] An anaphylactoid reaction occurred 5 minutes after the first dose of oral budesonide in a patient who had previously reacted in a similar way to mesalazine.[2]

1. Quintiliani R. Hypersensitivity and adverse reactions associated with the use of newer intranasal corticosteroids for allergic rhinitis. *Curr Ther Res* 1996; **57:** 478–88.
2. Heeringa M, *et al.* Anaphylactic-like reaction associated with oral budesonide. *BMJ* 2000; **321:** 927.

Interactions

The interactions of corticosteroids in general are described on p.1494.

Pharmacokinetics

For a brief outline of the pharmacokinetics of corticosteroids, see p.1495. Budesonide is rapidly and almost completely absorbed after oral administration, but has poor systemic availability (about 10%) due to extensive first-pass metabolism in the liver, mainly by the cytochrome P450 isoenzyme CYP3A4. The major metabolites, 6-β-hydroxybudesonide and 16-α-hydroxyprednisolone have less than 1% of the glucocorticoid activity of unchanged budesonide. Budesonide is reported to have a terminal half-life of about 2 to 4 hours.

◊ Reviews.

1. Donnelly R, Seale JP. Clinical pharmacokinetics of inhaled budesonide. *Clin Pharmacokinet* 2001; **40:** 427–40.
2. Edsbäcker S, Andersson T. Pharmacokinetics of budesonide (Entocort EC) capsules for Crohn's disease. *Clin Pharmacokinet* 2004; **43:** 803–21.
3. Kraft WK, *et al.* The pharmacokinetics of nebulized nanocrystal budesonide suspension in healthy volunteers. *J Clin Pharmacol* 2004; **44:** 67–72.
4. Lähelmä S, *et al.* Equivalent lung deposition of budesonide in vivo: a comparison of dry powder inhalers using a pharmacokinetic method. *Br J Clin Pharmacol* 2005; **59:** 167–73.

Uses and Administration

Budesonide is a corticosteroid with mainly glucocorticoid activity (p.1490). It is used by inhalation in the management of **asthma**, in usual doses of 400 micrograms daily in 2 divided doses from a metered-dose aerosol; in severe asthma the dosage may be increased up to a total of 1.6 mg daily, and guidelines for the management of asthma permit up to 2 mg daily (see p.1108). Maintenance doses may be less than 400 micrograms daily but should not be below 200 micrograms daily. A dose for children is 50 to 400 micrograms inhaled twice daily. Budesonide is also available for the management of asthma in the form of a dry powder inhaler; doses are 200 to 800 micrograms daily, as 2 divided doses or a single daily dose; up to 800 micrograms twice daily may be given to adults if necessary. Patients for whom budesonide from a pressurised inhaler or dry powder formulation is unsatisfactory may use a nebulised solution. The usual adult dosage by this method is 1 to 2 mg inhaled twice daily. This may be increased if asthma is severe. Maintenance doses are 0.5 to 1 mg inhaled twice daily. For children between 3 months and 12 years of age, an initial dose is 0.5 to 1 mg twice daily with a maintenance dose of 0.25 to 0.5 mg twice daily.

Budesonide is also given by inhalation as a nebulised solution in the management of childhood **croup** (p.1502). The usual dose is 2 mg, as a single inhaled dose or 2 doses of 1 mg, given 30 minutes apart.

Budesonide is used topically in the treatment of various **skin disorders**, as a cream, lotion, or ointment containing 0.025%. For recommendations concerning the correct use of corticosteroids on the skin, and a rough guide to the clinical potencies of topical corticosteroids, see p.1497.

Budesonide is also used intranasally for the prophylaxis and treatment of **rhinitis** (p.565). In the UK, two nasal spray preparations are available, one containing 100 micrograms per metered spray, and one containing 64 micrograms per metered spray. The initial recommended dose for adults and children over 12 years is either 2 sprays into each nostril once daily in the morning, or 1 spray into each nostril twice daily. This may be subsequently reduced to 1 spray into each nostril once daily; treatment can be continued for up to 3 months. In the USA and some other countries, a nasal spray and a nasal inhaler are available. The intranasal dose may be expressed in multiples of 32 micrograms, which is the quantity of budesonide delivered from the nasal adaptor. When given from a nasal inhaler, the recommended initial dose for adults and children over 6 years is 4 sprays into each nostril in the morning, or 2 sprays into each nostril twice daily, to give a total daily dose of 256 micrograms daily. This is reduced to the lowest dose adequate to control symptoms. If no benefit is seen after 3 weeks of treatment, budesonide should be stopped. When given as an aqueous nasal spray, the recommended initial dose for adults and children over 6 years is 1 spray into each nostril once daily (64 micrograms daily), increasing as necessary up to a maximum of 256 micrograms daily for adults and 128 micrograms daily for children aged less than 12 years. Budesonide is also used as a nasal spray in the management of **nasal polyps** (p.1508). In the UK, for adults and children over 12 years, 1 spray (containing 64 or 100 micrograms, as above) is given into each nostril twice daily for up to 3 months.

Local formulations of budesonide are used in the management of **inflammatory bowel disease** (see below). In mild to moderate Crohn's disease affecting the ileum or ascending colon it is given orally as modified-release capsules intended for a topical effect on the gastrointestinal tract. The recommended dose is 9 mg daily for active disease, as either a single dose before breakfast or in 3 divided doses about 30 minutes before meals, depending on the preparation. Treatment is given for up to 8 weeks, and the dosage should be reduced 2 to 4 weeks before discontinuing therapy. For recurring episodes of active Crohn's disease, an 8-week course may be repeated. After an 8-week course for active disease, budesonide 6 mg once daily is recommended for maintenance of clinical remission, for up to 3 months; thereafter, doses are tapered and therapy stopped, as continued treatment has not shown substantial clinical benefit. There is some absorption of budesonide from the gastrointestinal tract, and the dose may need to be reduced in patients with hepatic impairment, especially those with cirrhosis (see also Administration in Hepatic Impairment, below). Ulcerative colitis affecting the rectum and sigmoid colon may be treated locally with budesonide. A retention enema providing a dose of 2 mg in 100 mL is given daily at bedtime for 4 weeks, which may be extended to 8 weeks if the patient is not in remission after the initial 4-week course. Alternatively, a rectal foam can be used in a dose of 2 mg once daily, usually for 6 to 8 weeks. The dose may be given in the morning or the evening, but treatment is more effective if the bowel is emptied before a dose is given.