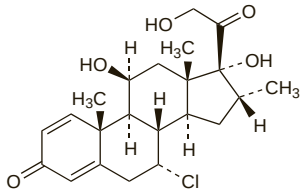
21. Jayne DRW, *et al.* Treatment of systemic vasculitis with pooled intravenous immunoglobulin. *Lancet* 1991; **337:** 1137–9.
22. Nowack R, *et al.* Mycophenolate mofetil for systemic vasculitis and IgA nephropathy. *Lancet* 1997; **349:** 774.
23. Keogh KA, *et al.* Rituximab for refractory Wegener's granulomatosis: report of a prospective, open-label pilot trial. *Am J Respir Crit Care Med* 2006; **173:** 180–7.

Alclometasone Dipropionate *(BANM, USAN, rINNM)* ⊗

Alclométasone, Dipropionate d'; Alclometasoni Dipropionas; Alklometasondipropionat; Alklometasonidipropionaatti; Dipropionato de alclometasona; Sch-22219. 7α-Chloro-11β,17α,21-trihydroxy-16α-methylpregna-1,4-diene-3,20-dione 17,21-dipropionate.

Альклометазона Дипропионат

$C_{28}H_{37}ClO_7$ = 521.0.
CAS — 67452-97-5 (alclometasone); 66734-13-2 (alclometasone dipropionate).
ATC — D07AB10; S01BA10.
ATC Vet — QD07AB10; QS01BA10.



(alclometasone)

Pharmacopoeias. In *US.*
USP 31 (Alclometasone Dipropionate). Store in airtight containers.

Profile
Alclometasone dipropionate is a corticosteroid used topically for its glucocorticoid activity (p.1490) in the treatment of various skin disorders. It is usually used as a cream or ointment containing 0.05%.

When applied topically, particularly to large areas, when the skin is broken, or under occlusive dressings, corticosteroids may be absorbed in sufficient amounts to cause systemic effects (p.1490). The effects of topical corticosteroids on the skin are described on p.1492. For recommendations concerning the correct use of corticosteroids on the skin, and a rough guide to the clinical potencies of topical corticosteroids, see Topical Application, p.1497.

Preparations
USP 31: Alclometasone Dipropionate Cream; Alclometasone Dipropionate Ointment.

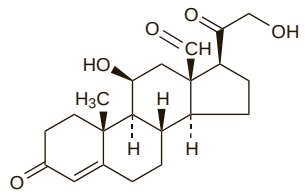
Proprietary Preparations (details are given in Part 3)
Austral.: Logoderm†; ***Chile:*** Logoderm†; ***Cz.:*** Afloderm; ***Denm.:*** Legederm†; ***Fin.:*** Legederm†; ***Ger.:*** Delonal; ***Gr.:*** Lomesone; ***Hong Kong:*** Perderm; ***Hung.:*** Perderm†; ***Indon.:*** Cloderm; Perderm; ***Irl.:*** Modrasone; ***Ital.:*** Legederm; ***Malaysia:*** Perderm†; ***Mex.:*** Logoderm; ***Neth.:*** Aclosone; ***NZ:*** Logoderm†; ***Port.:*** Miloderme; ***Rus.:*** Afloderm (Афлодерм); ***Singapore:*** Perderm†; ***Swed.:*** Legederm†; ***Switz.:*** Delonal†; ***UK:*** Modrasone; ***USA:*** Aclovate; ***Venez.:*** Demiderm.

Aldosterone *(BAN, rINN)*

Aldosteron; Aldosterona; Aldostérone; Aldosteroni; Aldosteronum; Electrocortin. 11β,18-Epoxy-18,21-dihydroxypregn-4-ene-3,20-dione.

Альдостерон

$C_{21}H_{28}O_5$ = 360.4.
CAS — 52-39-1.
ATC — H02AA01.
ATC Vet — QH02AA01.



Adverse Effects
Aldosterone has very pronounced mineralocorticoid actions and little effect on carbohydrate metabolism. It may therefore exhibit the mineralocorticoid adverse effects described for the corticosteroids in general (p.1490).

Uses and Administration
Aldosterone is the main mineralocorticoid (p.1490) secreted by the adrenal cortex. It has no significant glucocorticoid (anti-inflammatory) properties.

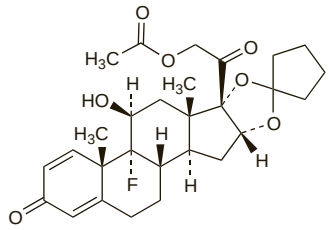
Aldosterone has been given by intramuscular or intravenous injection, with a glucocorticoid, in the treatment of primary adrenocortical insufficiency (p.1498) but synthetic mineralocorticoids such as fludrocortisone (p.1530), which can be given orally, are usually preferred. It has also been used as the sodium succinate.

Amcinonide *(BAN, USAN, rINN)* ⊗

Amcinónida; Amcinonidum; Amcinopol; CL-34699. 16α,17α-Cyclopentylidenedioxy-9α-fluoro-11β,21-dihydroxypregna-1,4-diene-3,20-dione 21-acetate.

Амцинонид

$C_{28}H_{35}FO_7$ = 502.6.
CAS — 51022-69-6.
ATC — D07AC11.
ATC Vet — QD07AC11.



Pharmacopoeias. In *US.*

Profile
Amcinonide is a corticosteroid used topically for its glucocorticoid activity (p.1490) in the treatment of various skin disorders. It is usually used as a cream, lotion, or ointment containing 0.1%.

When applied topically, particularly to large areas, when the skin is broken, or under occlusive dressings, corticosteroids may be absorbed in sufficient amounts to cause systemic effects (p.1490). The effects of topical corticosteroids on the skin are described on p.1492. 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.

Preparations
USP 31: Amcinonide Cream; Amcinonide Ointment.

Proprietary Preparations (details are given in Part 3)
Belg.: Amicla; ***Canad.:*** Amcort; Cyclocort; ***Fr.:*** Penticort†; ***Ger.:*** Amciderm; ***Mex.:*** Visderm H; ***Thai.:*** Amciderm; Visderm†; ***USA:*** Cyclocort†.

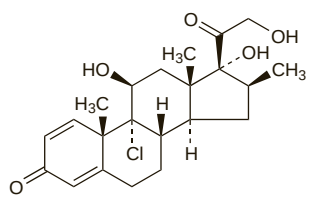
Beclometasone Dipropionate

(BANM, rINNM) ⊗

Béclométasone, dipropionate de; Beclometasoni dipropionas; Beclometasoni Diproprionas; Beclomethasone Dipropionate *(USAN)*; Beklometasondipropionat; Beklometason-dipropionát; Beklometasonidipropionaatti; Beklometazon Dipropiyonat; Beklometazon-diproprionát; Beklometazono dipropionatas; Beklometazonu dipropionian; 9α-Chloro-16β-methylprednisolone Dipropionate; Dipropionato de beclometasona; Sch-18020W. 9α-Chloro-11β,17α,21-trihydroxy-16β-methylpregna-1,4-diene-3,20-dione 17,21-dipropionate.

Беклометазона Дипропионат

$C_{28}H_{37}ClO_7$ = 521.0.
CAS — 4419-39-0 (beclometasone); 5534-09-8 (beclometasone dipropionate).
ATC — A07EA07; D07AC15; R01AD01; R03BA01.
ATC Vet — QA07EA07; QD07AC15; QR01AD01; QR03BA01.



(beclometasone)

Pharmacopoeias. In *Chin.*, *Eur.* (see p.vii), *Int.*, and *Jpn.*
US allows either the anhydrous or monohydrate form. *Eur.* also includes a separate monograph for the monohydrate.
Ph. Eur. 6.2 (Beclometasone Dipropionate, Anhydrous). A white or almost white, crystalline powder. Practically insoluble in water; sparingly soluble in alcohol; freely soluble in acetone. Protect from light.
Ph. Eur. 6.2 (Beclometasone Dipropionate Monohydrate). A white or almost white powder. Practically insoluble in water; sparingly soluble in alcohol; freely soluble in acetone. Protect from light.
USP 31 (Beclomethasone Dipropionate). It is anhydrous or contains one molecule of water of hydration. A white to cream white, odourless powder. Very slightly soluble in water; freely soluble in alcohol and in acetone; very soluble in chloroform.

Adverse Effects, Treatment, Withdrawal, and Precautions
As for corticosteroids in general (p.1490).

Adrenal suppression may occur in some patients treated with high-dose long-term inhalation therapy for asthma. It has been stated that in the majority of patients no significant suppression is likely to occur when total daily doses of less than 1.5 mg are used (but see Adrenal Suppression, below).

When applied topically, particularly to large areas, when the skin is broken, or under occlusive dressings, corticosteroids may be absorbed in sufficient amounts to cause systemic effects. Systemic absorption may also follow nasal use, particularly after high doses or prolonged treatment.

Adrenal suppression. The problem of adrenal suppression with corticosteroids is discussed on p.1491. Listed below are some references and correspondence concerning adrenal suppression due to beclometasone inhalation therapy,[1-8] in some cases occurring with doses below 1.5 mg daily.[6] However, one study found that function of the hypothalamic-pituitary-adrenal axis remained normal in most patients at beclometasone doses below 3 mg daily.[9]

1. Grant IWB, Crompton GK. Becloforte inhaler. *BMJ* 1983; **286:** 644–5.
2. Slessor IM. Becloforte inhaler. *BMJ* 1983; **286:** 645.
3. Ebden P, Davies BH. High-dose corticosteroid inhalers for asthma. *Lancet* 1984; **ii:** 576.
4. Law CM, *et al.* Nocturnal adrenal suppression in asthmatic children taking inhaled beclomethasone dipropionate. *Lancet* 1986; **i:** 942–4.
5. Brown HM. Nocturnal adrenal suppression in children inhaling beclomethasone dipropionate. *Lancet* 1986; **i:** 1269.
6. Maxwell DL, Webb J. Adverse effects of inhaled corticosteroids. *BMJ* 1989; **298:** 827–8.
7. Priftis K, *et al.* Adrenal function in asthma. *Arch Dis Child* 1990; **65:** 838–40.
8. Tabachnik E, Zadik Z. Diurnal cortisol secretion during therapy with inhaled beclomethasone dipropionate in children with asthma. *J Pediatr* 1991; **118:** 294–7.
9. Brown PH, *et al.* Large volume spacer devices and the influence of high dose beclomethasone dipropionate on hypothalamo-pituitary-adrenal axis function. *Thorax* 1993; **48:** 233–8.

Candidiasis. Results of a study involving 229 asthmatic children indicated that the presence of a sore throat or a hoarse voice was not related to the presence of *Candida* or to treatment with inhaled beclometasone.[1] The occurrence of only one clinical case of oral candidiasis in 129 of the children receiving beclometasone confirmed previous observations that it is an uncommon finding in children compared with the reported incidence of between 4.5 and 13% in adults. The incidence of colonisation with *Candida* was greater in those children who received corticosteroids than in those who did not but was not affected by either the dose or type of inhaler used.

1. Shaw NJ, Edmunds AT. Inhaled beclomethasone and oral candidiasis. *Arch Dis Child* 1986; **61:** 788–90.

Effects on the bones. The adverse effects of corticosteroids in general on bones are discussed on p.1491.

Studies in healthy subjects have shown that inhaled beclometasone dipropionate can suppress bone metabolism.[1-3] These studies measured biochemical markers such as serum-osteocalcin concentrations, serum alkaline phosphatase activity, and urinary hydroxyproline-creatinine ratio, over short periods of time. Another study found that markers of collagen turnover, but not osteocalcin, were reduced by beclometasone or budesonide 800 micrograms daily in mildly asthmatic children.[4] Results are difficult to interpret since osteocalcin concentrations are reduced in patients with asthma regardless of treatment,[5] and it is uncertain whether significant bone loss does occur in practice. One 12-month study[6] in adults with asthma found that biochemical markers showed suppressed bone formation from inhaled beclometasone, and that there was some loss of bone mineral density from the hip. This study also found that inhaled fluticasone, in equivalent therapeutic doses, may have less adverse effect on bone. Another, smaller, study[7] found no adverse effects from beclometasone or fluticasone on bone mass or metabolism. In a study[8] of asthmatic children, comparing those treated with inhaled budesonide with those who received no corticosteroids, an average daily dose of about 500 micrograms budesonide for 3 to 6 years did not adversely affect bone density and mineral measures.

1. Pouw EM, *et al.* Beclomethasone inhalation decreases serum osteocalcin concentrations. *BMJ* 1991; **302:** 627–8.

2. Ali N, *et al.* Beclomethasone and osteocalcin. *BMJ* 1991; **302:** 1080.
3. Teelucksingh S, *et al.* Inhaled corticosteroids, bone formation and osteocalcin. *Lancet* 1991; **338:** 60–1.
4. Birkebæk NH, *et al.* Bone and collagen turnover during treatment with inhaled dry powder budesonide and beclomethasone dipropionate. *Arch Dis Child* 1995; **73:** 524–7.
5. König P, *et al.* Bone metabolism in children with asthma treated with inhaled beclomethasone dipropionate. *J Pediatr* 1993; **122:** 219–26.
6. Pauwels RA, *et al.* Safety and efficacy of fluticasone and beclomethasone in moderate to severe asthma. *Am J Respir Crit Care Med* 1998; **157:** 827–32.
7. Medici TC, *et al.* Effect of one year treatment with inhaled fluticasone propionate or beclomethasone dipropionate on bone density and bone metabolism: a randomised parallel group study in adult asthmatic subjects. *Thorax* 2000; **55:** 375–82.
8. Agertoft L, Pedersen S. Bone mineral density in children with asthma receiving long-term treatment with inhaled budesonide. *Am J Respir Crit Care Med* 1998; **157:** 178–83.

Effects on growth. Meta-analysis of 3 eligible studies (out of 92 examined) concluded that inhaled beclometasone therapy at a dose of 400 micrograms daily may cause a 1.54 cm/year decrease in growth in children with mild to moderate asthma.[1] The long-term effects of treatment are unknown, and therefore it is not clear whether catch-up growth will occur on stopping therapy. The lowest possible dose of corticosteroid therapy should be used in asthma, and growth should be monitored.[1] There is also evidence[2] that long-term intranasal beclometasone for the treatment of allergic rhinitis can slow growth in children; the effect on final height is unknown. For further details of the effects of corticosteroids on growth, see p.1492.

1. Sharek PJ, *et al.* Beclomethasone for asthma in children: effects on linear growth. Available in The Cochrane Database of Systematic Reviews; Issue 3. Chichester: John Wiley; 1999 (accessed 12/05/05).
2. Skoner DP, *et al.* Detection of growth suppression in children during treatment with intranasal beclomethasone dipropionate. Abstract: *Pediatrics* 2000; **105:** 415–16. Full version: http://pediatrics.aappublications.org/cgi/content/full/105/2/e23 (accessed 27/04/04)

Effects on the lungs. Pulmonary eosinophilia has occurred in patients treated with inhaled beclometasone.[1-4]

1. Paterson IC, *et al.* Pulmonary eosinophilia after substitution of aerosol for oral corticosteroid therapy. *Br J Dis Chest* 1975; **69:** 217–22.
2. Hudgel DW, Spector SL. Pulmonary infiltration with eosinophilia: recurrence in an asthmatic patient treated with beclomethasone dipropionate. *Chest* 1977; **72:** 359–60.
3. Klotz LR, *et al.* The use of beclomethasone dipropionate inhaler complicated by the development of an eosinophilic pneumonia reaction. *Ann Allergy* 1977; **39:** 133–6.
4. Mollura JL, *et al.* Pulmonary eosinophilia in a patient receiving beclomethasone dipropionate aerosol. *Ann Allergy* 1979; **42:** 326–9.

Hypersensitivity. There have been reports of asthmatic reactions to beclometasone dipropionate inhalations, possibly associated with materials used in their formulation, or with the containers.[1-4]

1. Maddern PJ, *et al.* Adverse reaction after aerosol inhalation. *Med J Aust* 1978; **1:** 274.
2. Godin J, Malo JL. Acute bronchoconstriction caused by Beclovent and not Vanceril. *Clin Allergy* 1979; **9:** 585–9.
3. Clark RJ. Exacerbation of asthma after nebulised beclomethasone dipropionate. *Lancet* 1986; **ii:** 574–5.
4. Beasley R, *et al.* Benzalkonium chloride and bronchoconstriction. *Lancet* 1986; **ii:** 1227.

Reformulation. Reformulation of some metered-dose inhalers to use a chlorofluorocarbon (CFC)-free propellant has resulted in a change of efficacy. One CFC-free product (*Qvar, UK*) is reported to be effective at about half the dose[1] required with the standard product (see Uses and Administration, below) and the UK CSM has issued a reminder of the need for dosage reduction when converting from the conventional formulation to this product.[2] An open-label, crossover study in healthy subjects also found higher beclometasone plasma concentrations after use of another brand (*Beclozone, Eire*) of CFC-free product.[3] However, this dose reduction does not apply to all CFC-free formulations of beclometasone. A review[4] concluded that good studies on the bioequivalence between the reference beclometasone preparation and the newer CFC-free formulations are not available.

1. Davies RJ, *et al.* Hydrofluoroalkane-134a beclomethasone dipropionate extrafine aerosol provides equivalent asthma control to chlorofluorocarbon beclomethasone dipropionate at approximately half the total daily dose. *Respir Med* 1998; **92** (suppl): 23–31.
2. CSM/MCA. Dose of CFC-free inhaled beclomethasone (Qvar). *Current Problems* 1999; **25:** 5–6. Also available at: http://www.mhra.gov.uk/home/idcplg?IdcService=GET_FILE&dDocName=CON2023235&RevisionSelectionMethod=LatestReleased (accessed 06/07/06)
3. Lipworth BJ, Jackson CM. Pharmacokinetics of chlorofluorocarbon and hydrofluoroalkane metered-dose inhaler formulations of beclomethasone dipropionate. *Br J Clin Pharmacol* 1999; **48:** 866–8.
4. Derom E, Pauwels RA. Pharmacokinetic and pharmacodynamic properties of inhaled beclometasone dipropionate delivered via hydrofluoroalkane-containing devices. *Clin Pharmacokinet* 2005; **44:** 815–36.

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. Beclometasone is stated to be readily absorbed from sites of local application, and rapidly distributed to all body tissues. It is metabolised principally in the liver, but also in other tissues including gastrointestinal tract and lung; enzymatic hydrolysis rapidly produces the monopropionate (which has some glucocorticoid activity), and, more slowly, the free alcohol, which is virtually devoid of activity. Only a small proportion of an absorbed dose is excreted in urine, the remainder being excreted in the faeces mainly as metabolites.

Uses and Administration

Beclometasone dipropionate is a corticosteroid with mainly glucocorticoid activity (p.1490) that is stated to exert a topical effect on the lungs without significant systemic activity at recommended doses (but see Adrenal Suppression under Adverse Effects, above). It is used by inhalation, generally from a metered-dose aerosol, for the prophylaxis of asthma (see below).

Many formulations are now available, with differing dosage regimens, and the appropriate product literature should be consulted before starting therapy or changing to another formulation. Furthermore in the UK the doses of beclometasone dipropionate for asthma and rhinitis are expressed in units of 50 micrograms or multiples thereof (dose supplied into the mouthpiece per actuation) whereas in the USA the dose-unit is 42 micrograms or multiples thereof (dose emitted from the mouthpiece); recommended doses therefore appear somewhat lower in the USA than the UK doses given below, although in practical terms there is probably no difference.

In the UK the adult dosage of the **conventional aerosol** and some dry powder inhalers is usually 400 micrograms daily, inhaled in 2 to 4 divided doses for maintenance treatment; if necessary, 600 to 800 micrograms may be inhaled daily initially, subsequently adjusted according to the patient's response. In patients with severe asthma or in those showing only a partial response to standard inhalation doses, high-dose inhalation therapy may be considered; doses of 1 mg daily (250 micrograms four times daily or 500 micrograms twice daily) may be used and may be increased to 1.5 to 2 mg daily (500 micrograms three or four times daily) if necessary; a maximum of 2 mg daily should not be exceeded. In children, 50 or 100 micrograms may be inhaled 2 to 4 times daily according to the response or alternatively, 100 or 200 micrograms may be inhaled twice daily.

Although beclometasone dipropionate is generally inhaled in aerosol form, **inhalation capsules** or **discs** containing powder for inhalation are available for patients who experience difficulty in using the aerosol. Owing to differences in the relative bioavailability to the lungs a 100-microgram dose from an inhalation capsule or disc is approximately equivalent in activity to a 50-microgram dose from a conventional aerosol. Recommended maintenance doses of beclometasone dipropionate from inhalation capsules or discs are therefore *higher*: 200 micrograms inhaled 3 or 4 times daily or 400 micrograms inhaled twice daily for adults, and 100 micrograms inhaled 2 to 4 times daily or 200 micrograms inhaled twice daily for children. Up to 800 micrograms twice daily may be inhaled if necessary in adults requiring high-dose therapy.

In some countries beclometasone dipropionate is now available as a **CFC-free aerosol**. Because of changes in particle size the dose required from some such inhalers may be *lower* than that from a conventional aerosol: typical UK doses for one product (*Qvar*) range from 100 to 200 micrograms daily in mild asthma to 400 to 800 micrograms daily in severe asthma, given as 2 divided doses.

Inhalation of **nebulised** beclometasone dipropionate has also been used in the management of asthma in children.

Beclometasone dipropionate is also used as a **nasal spray** in the prophylaxis and treatment of allergic and non-allergic rhinitis (p.565). Usual doses are 100 micrograms in each nostril twice daily or 50 micrograms in each nostril 3 or 4 times daily; a total of 400 micrograms daily should not generally be exceeded. A dose of 50 micrograms in each nostril twice daily may be sufficient for prophylaxis. The nasal spray is also used to prevent recurrence of nasal polyps after surgical removal (p.1508).

Beclometasone dipropionate is also used **topically** in the treatment of various skin disorders. It is generally applied as a cream or ointment containing 0.025%. Beclometasone salicylate has also been used topically. 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.

Adenoidal hypertrophy. Although normally managed by surgery (or if less severe simply by symptomatic relief) adenoidal hypertrophy in children was reported to respond to aqueous nasal beclometasone 336 micrograms daily in an 8-week crossover study.[1] Improvements in adenoidal obstruction and symptom scores were enhanced in a subsequent 16-week follow-on study using 168 micrograms daily. Another similar study,[2] of an initial 4-week crossover period followed by 24 weeks of open-label treatment, found symptomatic improvements in about half of the patients, and at 100 weeks there was a decrease in the rate of adenotonsillectomy in children who had responded to beclometasone compared with nonresponders.

1. Demain JG, Goetz DW. Pediatric adenoidal hypertrophy and nasal airway obstruction: reduction with aqueous nasal beclomethasone. *Pediatrics* 1995; **95:** 355–64.
2. Criscuoli G, *et al.* Frequency of surgery among children who have adenotonsillar hypertrophy and improve after treatment with nasal beclomethasone. Abstract: *Pediatrics* 2003; **111:** 663. Full version: http://pediatrics.aappublications.org/cgi/content/full/111/3/e236 (accessed 27/04/04)

Asthma. Corticosteroids and $beta_2$-adrenoceptor agonists form the cornerstone of the management of asthma (p.1108). Patients requiring only occasional relief from symptoms may be managed with an inhaled short-acting $beta_2$ agonist, and an inhaled corticosteroid such as beclometasone is added if symptomatic relief is needed more than once daily. In more severe asthma other drugs may be added (combination with a long-acting $beta_2$ agonist may have synergistic benefits), or the dose of inhaled corticosteroid may be increased.

High-dose regimens may pose problems of compliance if beclometasone must be inhaled several times daily. However, one study[1] found once-daily inhalation to be as effective as the same dose divided into 2 daily inhalations in short-term control of moderate asthma. Also there have been doubts that increasing the dose of inhaled beclometasone brings about increased benefits,[2] but guidelines and clinical practice suggest that improved control can often be achieved by increasing the dose. A systematic review[3] noted that while there was little evidence of an effect of dose titration above 400 micrograms daily in those with mild to moderate asthma, evidence was lacking in patients with more severe disease (who are more likely to be given high-dose therapy), and studies were needed to resolve the question.

Inhalation of beclometasone dipropionate as a nebulised solution has been found to be useful in the management of severe asthma in children aged 2 years or under previously unresponsive to other drugs.[4] Nebulised beclometasone dipropionate was also effective in the management of recurrent episodes of bronchopulmonary obstruction following bronchiolitis in children under 2 years of age.[5] However, in other reports nebulised beclometasone dipropionate, although more effective than saline in pre-school children, produced a response less than that usually observed with inhalation of beclometasone from an aerosol or capsules,[6] or no benefit at all.[7] This may have been due to beclometasone somehow failing to reach the lungs.[8] In pre-school children able to use a spacer device with a metered aerosol, intermittent therapy with high-dose beclometasone dipropionate, given at the first sign of symptoms, reduced the severity of acute episodic asthma.[9]

1. Gagnon M, *et al.* Comparative safety and efficacy of single or twice daily administration of inhaled beclomethasone in moderate asthma. *Chest* 1994; **105:** 1732–7.
2. Boe J, *et al.* High-dose inhaled steroids in asthmatics: moderate efficacy gain and suppression of the hypothalamic-pituitary-adrenal axis. *Eur Respir J* 1994; **7:** 2179–84.
3. Adams NP, *et al.* Beclomethasone versus placebo for chronic asthma. Available in The Cochrane Database of Systematic Reviews; Issue 1. Chichester: John Wiley; 2005 (accessed 22/08/08).
4. Pedersen W, Prahl P. Jet-nebulized beclomethasone dipropionate in the management of bronchial asthma: topical steroids for asthmatic children younger than 4 years. *Allergy* 1987; **42:** 272–5.

5. Carlsen KH, *et al.* Nebulised beclomethasone dipropionate in recurrent obstructive episodes after acute bronchiolitis. *Arch Dis Child* 1988; **63:** 1428–33.
6. Storr J, *et al.* Nebulised beclomethasone dipropionate in preschool asthma. *Arch Dis Child* 1986; **61:** 270–3.
7. Webb MSC, *et al.* Nebulised beclomethasone dipropionate suspension. *Arch Dis Child* 1986; **61:** 1108–10.
8. Clarke SW. Nebulised beclomethasone dipropionate suspension: commentary. *Arch Dis Child* 1986; **61:** 1110.
9. Wilson NM, Silverman M. Treatment of acute, episodic asthma in preschool children using intermittent high dose inhaled steroids at home. *Arch Dis Child* 1990; **65:** 407–10.

Chronic obstructive pulmonary disease. For discussion of the value of inhaled corticosteroids in chronic obstructive pulmonary disease, see p.1501.

Cough. In children with recurrent cough inhalation of beclometasone 200 micrograms twice daily from a conventional aerosol or salbutamol 200 micrograms twice daily had no effect on cough frequency or severity.[1] However, in another study of 200 adults, use of beclometasone, salbutamol, or sodium cromoglicate (all in aerosol formulation) given 15 minutes before anaesthesia, significantly decreased coughing caused by fentanyl when compared with placebo. Of the 50 patients given beclometasone, none experienced coughing.[2]

1. Chang AB, *et al.* A randomised, placebo controlled trial of inhaled salbutamol and beclomethasone for recurrent cough. *Arch Dis Child* 1998; **79:** 6–11.
2. Agarwal A, *et al.* Salbutamol, beclomethasone or sodium chromoglycate suppress coughing induced by iv fentanyl. *Can J Anesth* 2003; **50:** 297–300.

Graft-versus-host disease. Beclometasone is under investigation for its topical effect in the treatment of intestinal graft-versus-host disease (GVHD). A study[1] in patients with acute intestinal GVHD after bone marrow transplantation (see Haematopoietic Stem Cell Transplantation, p.1811) found that addition of oral beclometasone to prednisolone therapy was associated with a greater proportion of durable responses after 30 days. Repeated courses may be needed in some patients to achieve and maintain response, but prolonged therapy appears to be feasible.[2]

1. McDonald GB, *et al.* Oral beclomethasone dipropionate for treatment of intestinal graft-versus-host disease: a randomized, controlled trial. *Gastroenterology* 1998; **115:** 28–35.
2. Iyer RV, *et al.* Long-term use of oral beclomethasone dipropionate for the treatment of gastrointestinal graft-versus-host disease. *Biol Blood Marrow Transplant* 2005; **11:** 587–92.

Inflammatory bowel disease. Beclometasone 500 micrograms given nightly as an enema was as effective as betamethasone 5 mg enemas in the treatment of acute attacks of distal ulcerative colitis.[1] Although betamethasone produced slightly superior histological improvement and faster disappearance of blood from the stools, systemic adverse effects observed with betamethasone therapy were absent in patients treated with beclometasone.

Comparisons of beclometasone dipropionate enemas (3 mg) with prednisolone sodium phosphate enemas[2] (30 mg) or mesalazine enemas[3] (1 g) found them to be equally effective. Treatment was well tolerated. Beclometasone dipropionate has also been investigated for the oral treatment of ulcerative colitis.[4,5]

For a review of the management of inflammatory bowel disease, including the role of corticosteroids, see p.1697.

1. Halpern Z, *et al.* A controlled trial of beclomethasone versus betamethasone enemas in distal ulcerative colitis. *J Clin Gastroenterol* 1991; **13:** 38–41.
2. Campieri M, *et al.* Beclomethasone dipropionate enemas versus prednisolone sodium phosphate enemas in the treatment of distal ulcerative colitis. *Aliment Pharmacol Ther* 1998; **121:** 361–6.
3. Gionchetti P, *et al.* Italian BDP Study Group. Topical treatment of distal active ulcerative colitis with beclomethasone dipropionate or mesalamine: a single-blind randomized controlled trial. *J Clin Gastroenterol* 2005; **39:** 291–7.
4. Rizzello F, *et al.* Oral beclomethasone dipropionate in the treatment of active ulcerative colitis: a double-blind placebo-controlled study. *Aliment Pharmacol Ther* 2002; **16:** 1109–16.
5. Campieri M, *et al.* Oral beclometasone dipropionate in the treatment of extensive and left-sided active ulcerative colitis: a multicentre randomised study. *Aliment Pharmacol Ther* 2003; **17:** 1471–80.

Preparations

BP 2008: Beclometasone Cream; Beclometasone Nasal Spray; Beclometasone Ointment; Beclometasone Powder for Inhalation; Beclometasone Pressurised Inhalation.

Proprietary Preparations (details are given in Part 3)
Arg.: Airbeclosona; Egosona†; Menaderm Simple; Propavent; Qvar†; Rectomenaderm; Rinosol; ***Austral.:*** Aldecin†; Becloforte†; Beconase; Beconase Hayfever; Becotide; Qvar; ***Austria:*** Aerocortin; Beclomet; Beconase; Becotide; Clenil; ***Belg.:*** Beclometatop; Beclophar; Beconase; Becotide†; Qvar; ***Braz.:*** Alerfin; Beclosol; Clenil; Miflasona; ***Canad.:*** Gen-Beclo; Propaderm; Qvar; Rivanase; ***Chile:*** Beclosema; Beclovent†; Beconase†; Destap; Filair; Flumates; Xiten†; ***Cz.:*** Aldecin; Beclazone†; Becloforte; Beclomet; Becodisks; Beconase; Becotide; Clenil; Ecobec; Miflason†; Nasobec; ***Denm.:*** AeroBec; Beclomet; Beconase; ***Fin.:*** AeroBec; Beclomet; Beclonasal; Beconase; Becotide†; ***Fr.:*** Asmabec; Beclo-Rhino; Beclojet; Beclone; Beclospin; Beconase; Becotide; Bemedrex; Ecobec; Humex Rhume des Foins; Miflasone; Nexxair; Prolair; Qvar; Spir†; ***Ger.:*** AeroBec; Beclo; Beclo Sioxwo†; Beclobreathe; Beclohexal; Beclomet; Beclorhinol; Becloturmant; Beconase Aquosum; Bronchocort; Junik; ratioAllerg; Rhinivict; Sanasthmax; Sanasthmyl; Ventolair; Viarox†; ***Gr.:*** Beclomet†; Becolex; Becotide†; Bidiclin; Clenil Forte Jet; Clenil Rino; Clenil†; Qvar; Respocort; Rinosol; ***Hong Kong:*** Aldecin†; Beclate; Beclazone; Beclo Asma†; Becloforte†; Becodisks; Beconase; Becotide; Cycloson; Nasobec; Qvar; ***Hung.:*** Aldecin†; Beclomet†; Beclonasal; Ecobec†; ***India:*** Beclate; ***Indon.:*** Beclomet; Beconase; Becotide; Cleniderm; ***Irl.:*** AeroBec†; Asmabec; Beclazone; Beclo-Rhino; Becodisks†; Beconase; Becotide; Nasobec; Qvar; ***Israel:*** Becloforte; Beconase†; Becotide†; Rhinocort; Viarex; ***Ital.:*** Becotide; Becotide A†; Bronco-Turbinal†; Clenil; Clenilexx; Clipper; Klostenal; Menaderm Simplex; Prontinal; Rino Clenil; Topster; Turbinal; ***Jpn:*** Propaderm; Rhinocort; Salcoat; ***Malaysia:*** Atomase†; Beclate; Beclazone; Becloforte†; Beclomet; Beconase; Becotide†; Clenil; Qvar; ***Mex.:*** Beclazone; Beconase; Becotide; Dobipro; Rifferina; ***Neth.:*** AeroBec†; Aldecin; Beclodin; Becloforte; Beconase; Becotide; Clenil; Qvar; Viarin; ***Norw.:*** AeroBec; Beclomet; Becotide; ***NZ:*** Alanase; Atomase; Atomide†; Beclazone; Beconase Hayfever; Miflasone†; Qvar; Respocort; ***Philipp.:*** Qvar; ***Pol.:*** Becodisk; Cortare; Nasobec; ***Port.:*** Aldecina†; Beclotaide; Beconase; Clenil; Ecobec; ***Rus.:*** Aldecin (Альдецин); Beclazone (Беклазон); Becloforte (Беклофорте); Beclojet (Беклоджет); Becodisk (Бекодиск); Beconase (Беконазе)†; Becotide (Бекотид); Clenil (Кленил); Nasobec (Насобек); ***S.Afr.:*** AeroBec†; Anceron†; Beceze†; Beclate; Becloforte; Becodisks†; Beconase; Becotide; Clenil†; Cycloson†; Nobec†; Qvar; Ventnaze; Viarox†; ***Singapore:*** Atomase†; Beclazone†; Beclo Asma; Becloforte†; Beclomet; Becotide†; Clenil†; Decomit; Qvar†; Rino Clenil†; ***Spain:*** Asmabec†; Beclo Asma; Beclo Rino; Becloenema; Becloforte; Beclomet; Beclosona; Beconase; Becotide; Betsuril†; Broncivent†; Decasona†; Dereme; Menaderm Simple; Qvar†; Recto Menaderm NF; ***Swed.:*** AeroBec; Beclomet; Becotide; ***Switz.:*** AeroBec†; BECeco; Becloforte†; Beclomet†; Beclonarin; Becodisk; Beconase; Beconasol; Becotide†; ***Thai.:*** Atomase; Becloforte†; Beclomet; Becodisk†; Beconase; Becotide†; Bemase; Clenil; Rino Clenil; ***Turk.:*** Becloforte; Becodisks; Becotide; Beklamet; Beklazon; Filair; ***UAE:*** Beclohale; ***UK:*** AeroBec; Asmabec; Beceze; Beclazone; Becloforte†; Beclogen; Becodisks; Beconase; Becotide†; Clenil; Clipper; Filair; Hayfever Relief; Nasal-Bec†; Nasobec; Pollenase Nasal; Propaderm†; Pulvinal Beclometasone Dipropionate; Qvar; Vivabec; ***USA:*** Beclovent; Beconase; Qvar; Vancenase†; ***Venez.:*** Aldecina†; Beclofortil; Beclomet†; Beclorino; Beclosil; Beconase; Biobeclasona; Biobeclod; Genbeclo; Nasair; Rinoclenil†.

Multi-ingredient: ***Arg.:*** Beclasma; Biotaer Gamma†; Biotaer Nebulizable; Butocort; Butosol; Menaderm N; Salbutol Beclo; Ventide; ***Austria:*** Ventide; ***Braz.:*** Aerotide; Clenil Compositum; ***Chile:*** Aero-Plus; Aerosoma; Asmavent-B; Beclasma†; Belomet; Broncoterol-B†; Butotal B; Herolan Aerosol; Ventide; ***Cz.:*** Clenigen†; Combair; Formodual; ***Fr.:*** Innovair; ***Hong Kong:*** Ventide; ***India:*** Aerocort; Anovate; Beclate-C; Beclate-N; Candibiotic; Candid B; Candiderma +; Candiderma†; Cloben-G; Clocip B; Clocip NB; Cutinorm†; Ecodax†; NC-Derm; Otek-AC+; Pilovate; Sigmaderm; Stecort-NM; Translipo-Triple; ***Indon.:*** Ventide; ***Ital.:*** Clenil Compositum; Menaderm; Ventolin Flogo†; ***Mex.:*** Ventide; ***Philipp.:*** Candibec; ***Port.:*** Formodual; Foster; ***Rus.:*** Candibiotic (Кандибиотик); Candid B (Кандид Б); ***Singapore:*** Clenil Compositum†; Ventide†; ***Spain:*** Butosol; Menaderm Clio; Menaderm Neomicina; Menaderm Otologico; ***Thai.:*** Clenil Compositum; Ventide†; ***Turk.:*** Ventide; ***UK:*** Fostair; ***Venez.:*** Aerocort; Beclomet Compositum†; Beclosal; Butosol; Salbutide†; Venticort; Ventide.

Betamethasone *(BAN, USAN, rINN)* ⊗

Beetametasoni; Betadexamethasone; Betametason; Betametasona; Betametazon; Betametazonas; Betamethason; Bétaméthasone; Betamethasonum; Flubenisolone; Flubenisolonum; 9α-Fluoro-16β-methylprednisolone; β-Methasone; NSC-39470; Sch-4831. 9α-Fluoro-11β,17α,21-trihydroxy-16β-methylpregna-1,4-diene-3,20-dione.

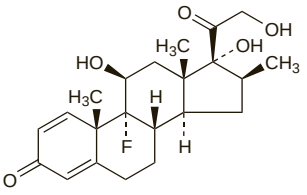
Бетаметазон

$C_{22}H_{29}FO_5$ = 392.5.

CAS — 378-44-9.

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

ATC Vet — QA07EA04; QC05AA05; QD07AC01; QD07XC01; QH02AB01; QR01AD06; QR03BA04; QS01BA06; QS01CB04; QS02BA07; QS03BA03.



Pharmacopoeias. In *Chin.*, *Eur.* (see p.vii), *Int.*, *Jpn*, and *US*.
Ph. Eur. 6.2 (Betamethasone). A white or almost white, crystalline powder. Practically insoluble in water; sparingly soluble in dehydrated alcohol; very slightly soluble in dichloromethane. Protect from light.
USP 31 (Betamethasone). A white to practically white, odourless, crystalline powder. Soluble 1 in 5300 of water, 1 in 65 of alcohol, 1 in 15 of warm alcohol, 1 in 325 of chloroform, and 1 in 3 of methyl alcohol; sparingly soluble in acetone and in dioxan; very slightly soluble in ether. Store in airtight containers at a temperature between 2° and 30°.

Betamethasone Acetate *(BANM, rINNM)* ⊗

Acetato de betametasona; Beetametasoniasetaatti; Betametasonacetat; Betametazon Asetat; Betametazon-acetát; Betametazono acetatas; Betamethason-acetát; Bétaméthasone, acétate de; Betamethasoni acetas. Betamethasone 21-acetate.

Бетаметазона Ацетат

$C_{24}H_{31}FO_6$ = 434.5.

CAS — 987-24-6.

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) and *US*.
Ph. Eur. 6.2 (Betamethasone Acetate). A white or almost white, crystalline powder. Practically insoluble in water; soluble in alcohol and in dichloromethane; freely soluble in acetone. It shows polymorphism. Protect from light.
USP 31 (Betamethasone Acetate). A white to creamy-white, odourless powder. Soluble 1 in 2000 of water, 1 in 9 of alcohol, and 1 in 16 of chloroform; freely soluble in acetone. Store in airtight containers at a temperature between 2° and 30°.

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

Benzoato de betametasona; Bétaméthasone, Benzoate de; Betamethasoni Benzoas; W-5975. Betamethasone 17α-benzoate.

Бетаметазона Бензоат

$C_{29}H_{33}FO_6$ = 496.6.

CAS — 22298-29-9.

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

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

Pharmacopoeias. In *US*.
USP 31 (Betamethasone Benzoate). A white to practically white, practically odourless, powder. Insoluble in water; soluble in alcohol, in chloroform, and in methyl alcohol. Store in airtight containers at a temperature between 2° and 30°.

Betamethasone Dipropionate

(BANM, USAN, rINNM) ⊗

Beetametasonidipropionaatti; Betametasondipropionat; Betametazon Dipropiyonat; Betametazon-dipropionát; Betametazono dipropionatas; Betametazonu dipropionian; Betamethasondipropionát; Bétaméthasone, dipropionate de; Betamethasoni dipropionas; Dipropionato de betametasona; Sch-11460. Betamethasone 17α,21-dipropionate.

Бетаметазона Дипропионат

$C_{28}H_{37}FO_7$ = 504.6.

CAS — 5593-20-4.

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

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

NOTE. Compounded preparations of betamethasone dipropionate may be represented by the following names:

- Co-climasone (*PEN*)—clotrimazole and betamethasone dipropionate.

Pharmacopoeias. In *Eur.* (see p.vii), *Jpn*, and *US*.
Ph. Eur. 6.2 (Betamethasone Dipropionate). A white or almost white, crystalline powder. Practically insoluble in water; sparingly soluble in alcohol; freely soluble in acetone and in dichloromethane. Protect from light.
USP 31 (Betamethasone Dipropionate). A white to cream-white, odourless powder. Insoluble in water; sparingly soluble in alcohol; freely soluble in acetone and in chloroform. Store in airtight containers at a temperature of 25°, excursions permitted between 15° and 30°.

Betamethasone Sodium Phosphate

(BANM, rINNM) ⊗

Beetametasoninatriumfosfaatti; Betametasonnatrifosfatum; Betametazon Disodyum Fosfat; Betametazon-nátrium-foszfát; Betametazono natrio fosfatas; Betamethasone Disodium Phosphate; Bétaméthasone, phosphate sodique de; Betamethason-fosfát sodná sůl; Betamethasoni natrii phosphas; Fosfato sódico de betametasona; Natrii Betamethasoni Phosphas. Betamethasone 21-(disodium phosphate).

Натрия Бетаметазона Фосфат

$C_{22}H_{28}FNa_2O_8P$ = 516.4.

CAS — 360-63-4 (betamethasone phosphate); 151-73-5 (betamethasone sodium phosphate).

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

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

NOTE. BET is a code approved by the BP 2008 for use on single unit doses of eye drops containing betamethasone sodium phosphate where the individual container may be too small to bear all the appropriate labelling information.

Pharmacopoeias. In *Eur.* (see p.vii), *Jpn*, and *US*.
Ph. Eur. 6.2 (Betamethasone Sodium Phosphate). A white or almost white, very hygroscopic, powder. Freely soluble in water; slightly soluble in alcohol; practically insoluble in dichloromethane. A 1% solution in water has a pH of 7.5 to 9.0. Store in airtight containers. Protect from light.
USP 31 (Betamethasone Sodium Phosphate). A white to practically white, odourless, hygroscopic, powder. Soluble 1 in 2 of water and 1 in 470 of alcohol; freely soluble in methyl alcohol; practically insoluble in acetone and in chloroform. Store in airtight containers.