reduce the endolymphatic fluid volume and pressure and any transient improvement in hearing is measured. However, the adverse effects of glycerol such as headache, nausea, and vomiting can be a problem and the test has been reported to have low sensitivity and to give false-positive results. See also under Effects on the Ears, above.

1. Skalabrin TA, Mangham CA. Analysis of the glycerin test for Meniere's disease. *Otolaryngol Head Neck Surg* 1987; **96:** 282–8.

Raised intracranial pressure. Glycerol has been given intravenously or by mouth for its osmotic diuretic effect to reduce cerebral oedema and hence decrease the intracranial pressure (p.1181). It is also reported to be able to increase blood flow to areas of brain ischaemia. It has been used in a variety of clinical conditions[1] including cerebral infarction or stroke,[2] Reye's syndrome,[3] and meningitis.[4,5] It has been postulated[5] that glycerol's beneficial action in preventing the neurological sequelae in bacterial meningitis is due to its effects in increasing cerebral plasma osmolality, which reduces cerebral oedema and enhances cerebral circulation by reducing the excretion of cerebrospinal fluid, and that this may be more important than the decrease in intracranial pressure induced by osmotic diuresis. Glycerol has been reported to be ineffective in hepatic coma.[6] Some patients have had serious adverse effects including haemolysis, haemoglobinuria, and renal failure.[7,8]

1. Frank MSB, *et al*. Glycerol: a review of its pharmacology, pharmacokinetics, adverse reactions, and clinical use. *Pharmacotherapy* 1981; **1:** 147–60.
2. Righetti E, *et al*. Glycerol for acute stroke. Available in The Cochrane Database of Systematic Reviews; Issue 2. Chichester: John Wiley; 2004 (accessed 23/05/06).
3. Nahata MC, *et al*. Variations in glycerol kinetics in Reye's syndrome. *Clin Pharmacol Ther* 1981; **29:** 782–7.
4. Kilpi T, *et al*. Oral glycerol and intravenous dexamethasone in preventing neurologic and audiologic sequelae of childhood bacterial meningitis. *Pediatr Infect Dis J* 1995; **14:** 270–8.
5. Peltola H, *et al*. Adjuvant glycerol and/or dexamethasone to improve the outcomes of childhood bacterial meningitis: a prospective, randomized, double-blind, placebo-controlled trial. *Clin Infect Dis* 2007; **45:** 1277–86.
6. Record CO, *et al*. Glycerol therapy for cerebral oedema complicating fulminant hepatic failure. *BMJ* 1975; **ii:** 540.
7. Hägnevik K, *et al*. Glycerol-induced haemolysis with haemoglobinuria and acute renal failure: report of three cases. *Lancet* 1974; **i:** 75–7.
8. Welch KMA, *et al*. Glycerol-induced haemolysis. *Lancet* 1974; **i:** 416–17.

Trigeminal neuralgia. Selective destruction of pain-bearing nerves is reserved for patients who do not respond to conventional drug therapy for trigeminal neuralgia (p.9). This may be achieved by the instillation of glycerol among the trigeminal rootlets (percutaneous retrogasserian glycerol rhizolysis).[1-5] The efficacy and safety of this procedure have been debated,[1,4] but some centres report good long-term results in the majority of patients.[5] It has been suggested that variations in viscosity and osmolality may influence results.[2]

1. Sweet WH. The treatment of trigeminal neuralgia (tic douloureux). *N Engl J Med* 1986; **315:** 174–7.
2. Waltz TA, Copeland BR. Treatment of trigeminal neuralgia. *N Engl J Med* 1987; **316:** 693.
3. Young RF. Glycerol rhizolysis for treatment of trigeminal neuralgia. *J Neurosurg* 1988; **69:** 39–45.
4. Burchiel KJ. Percutaneous retrogasserian glycerol rhizolysis in the management of trigeminal neuralgia. *J Neurosurg* 1988; **69:** 361–6.
5. Jho H-D, Lunsford LD. Percutaneous retrogasserian glycerol rhizotomy: current technique and results. *Neurosurg Clin N Am* 1997; **8:** 63–74.

Preparations

BP 2008: Glycerol Eye Drops; Glycerol Suppositories; Phenol and Glycerol Injection;
USP 31: Calamine Topical Suspension; Glycerin Ophthalmic Solution; Glycerin Oral Solution; Glycerin Suppositories.

Proprietary Preparations (details are given in Part 3)
Arg.: Refenax Lagrimas; Vixorfit; ***Austral.:*** Bausch & Lomb Computer Eye Drops; ***Braz.:*** Glicel†; ***Chile:*** Fleet Babylax; ***Fr.:*** Bebegel; ***Ger.:*** Glycerosteril; Glycilax; Milax; Nene-Lax; Otodolor Soft; ***Gr.:*** Glicerolo microclismi†; Glycare; Microclismata; ***Hong Kong:*** Computer Eye Drops; Fleet Babylax; Glyceol; Wet Stuff; ***Irl.:*** Babylax; ***Israel:*** Minilax†; ***Ital.:*** Verolax; Zetalax; ***Jpn:*** Glyceol; ***Malaysia:*** Egozite Protective Baby Lotion; Fleet Babylax; ZenCare; ***Mex.:*** Estrin; Fleet Adulto; Fleet Infantil; Fleet Pedialax; Microno-vag; Neutrobar; PC; Supositorios Senosiain; ***Philipp.:*** Babylax; Computer Eye Drops; Novas; United Home Glydolax; ***Port.:*** Bebegel; Doloreto; Glycelax; Microcel; Rectiole; Verolax; ***S.Afr.:*** Regard; ***Singapore:*** Acnederm Wash; Fleet Babylax†; ***Spain:*** Adulax; Comosup; Gely; Glicerotens; Paidolax; Supo Gliz; Verolax; Vitrosups; ***Swed.:*** Miniderm; ***Switz.:*** Bulboid; Practomil; ***Thai.:*** Glyceol; Glycerosteril†; ***UAE:*** Laxolyne; ***UK:*** Benylin Tickly Coughs; Boots Cough Syrup 3 Months Plus; CalCough Tickly; Neutrogena Norwegian Formula Dermatological Cream; Nirolex Dry Cough; Senokot Direct Relief; Tixylix Baby Syrup; ***USA:*** Colace Infant/Child; Computer Eye Drops†; Eye-Lube-A; Fleet Babylax; Listermint Arctic Mint Mouthwash; Osmoglyn; Sani-Supp; ***Venez.:*** Fleet Babylax.

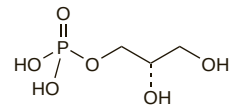
Multi-ingredient: ***Arg.:*** Irix Lagrimas; Keracnyl; Micronema; Sincerum Dry; Skleremo†; Ureadin Facial; Visine Lagrimas; ***Austral.:*** Aci-Jel†; Anusol; Auralgan; Egopsoryl TA; Hamilton Body Lotion†; Hamilton Cleansing Lotion†; Hamilton Dry Skin; Magnoplasm; SM-33; Soothe'n Heal; Visine True Tears†; ***Austria:*** Lacrisic; ***Belg.:*** Aloplastine; Laxavit; ***Braz.:*** Bluderm†; Dermamina; Effidrate†; Estomafitino†; Pasta d'Agua†; Trisorb; Varikromo†; ***Canad.:*** Agarol Plain; Auralgan; Bronchex†; Epi-Lyt; Lubriderm Advanced Moisture†; Moisture Drops†; Rhinedrine Moisturizing†; Swim-Ear†; Tears Naturale Forte; Tucks; ***Chile:*** Acnoxyl Jabon Liquido; Agarol; Cicapost; Nasivin; Ureadin Rx DB; Ureadin Rx RD; ***Denm.:*** Analka; Glyoktyl; Pectyl; ***Fr.:*** Aloplastine; Charlieu Topicrem; Derm'Intim; Dexeryl; Eryange†; Ictyane; Ictyane HD; Kertyol-S; Pharmatex; PSO; Rectopanbiline; Saugella; Scleremo; Septiane; Taido; ***Ger.:*** GeloBacin; Lacrisic; Lubrikano; Norgalax Miniklistier; Zinksalbe; ***Hong Kong:*** Acnederm; Acnederm Wash; Aderma Dermalibour†; Aderma Exomega†; Apaisac; Baby Cough with Antihistamine; Ego Skin Cream; Egopsoryl TA; Gly Thymol; Moisture Eyes; Tears Naturale Forte; Visine for Contacts; ***India:*** Neotomic; Otogesic; ***Indon.:*** Isotic Tearin; Laxadine; ***Irl.:*** Micolette; ***Israel:*** Dryears; Kamil Blue; Microlet; Taro Gel; ***Ital.:*** Dropyal; Evasen Dischetti; Evasen Liquido; Glicerolax; Microclismi Marco Viti; Microclismi Sella; Naturalass; Novilax; Rinogutt Atlantic; Salviette H; Solecin; ***Malaysia:*** Ego Skin Cream; Lorasil Feminine Hygeine†; ***Mex.:*** Maxibiloba; Moisture Eyes; Nasalub; Nutegen G†; Nutrasorb; ***NZ:*** Aci-Jel†; Auralgan; Ego Skin Cream; Karicare Breast and Body Cream†; Karicare Ointment†; Lemsip Dry Cough†; Rosken Skin Repair; Silic; ***Philipp.:*** Lactaderm; Moisture Eyes; pHCare; Visine Refresh; ***Pol.:*** Rektiolax; Unibasis; ***Port.:*** Antiacneicos Niacex†; Cicapost; Dagragel; Hidratante VG; Lubrificante Anestesico; Multi-Mam Compressas†; Nutraisdin; Ureadin Facial; Ureadin Maos; ***S.Afr.:*** Auralyt; Caloplast; Moisture Drops†; ***Singapore:*** Acnederm; Ego Skin Cream; Egozite Protective Baby Lotion†; Topicrem; Tropex; ***Switz.:*** Lacrycon; Neo-Decongestine; Realderm; ***Thai.:*** Baby Cough Syrup Atlantic; Baby Cough with Antihistamine; ***Turk.:*** Gleitgelen; Kalmosan; Kansilak; Libalaks; Sabalax; ***UK:*** Allens Junior Cough; Asonor; Beehive Balsam; Earex Plus; Honey & Molasses; Imuderm; Jackson's Lemon Linctus; Jackson's Troublesome Coughs; Lemsip Cough & Cold Dry Cough; Lockets; Lockets Medicated Linctus; Meltus Honey & Lemon; Micolette; Relaxit; Swim-Ear; ***USA:*** Allergen; Astroglide; Auralgan; Cetaklenz; Clearasil Antibacterial; Collyrium Fresh†; Entertainer's Secret; Epi-Lyt; Formulation R; Hemorid For Women; Maxilube; Moisture Drops; N'ice; Numzit†; Preparation H; Refresh Dry Eye Therapy; Summers Eve Anti-Itch; Surgel; Swim-Ear; Therevac Plus; Therevac SB; Trimo-San; Tucks; Visine Pure Tears; Visine Tears; ***Venez.:*** Audocaina†.

Glycerophosphoric Acid

Glicerofosfórico, ácido; Glycerylphosphoric Acid; Monoglycerylphosphoric Acid.

$C_3H_9O_6P$ = 172.1.

CAS — 27082-31-1; 57-03-4 (α-glycerophosphoric acid); 17181-54-3 (β-glycerophosphoric acid); 5746-57-6 (L-α-glycerophosphoric acid); 1509-81-5 (DL-α-glycerophosphoric acid).



(L-α-glycerophosphoric acid)

Sodium Glycerophosphate

Glycerofosforečnan sodný; Natrii glycerophosphas; Natrio glicerofosfatas; Natrium Glycerophosphoricum; Nátriumglicerofoszfát; Natriumglycerofosfat; Natriumglyserofosfaatti hydratoitu; Sodium, glycérophosphate de; Sodium Glycerylphosphate.

$C_3H_7Na_2O_6P.xH_2O$ = 216.0 (anhydrous).

CAS — 1555-56-2 (anhydrous α-sodium glycerophosphate); 819-83-0 (β-sodium glycerophosphate, anhydrous).

ATC — B05XA14.

ATC Vet — QB05XA14.

Pharmacopoeias. In *Chin.* and *Eur.* (see p.vii).
Ph. Eur. 6.2 (Sodium Glycerophosphate, Hydrated). A white or almost white, crystalline powder or crystals. Freely soluble in water; practically insoluble in alcohol and in acetate.

Profile

Glycerophosphoric acid and various glycerophosphates have been used in tonics. They were once considered as a suitable means of providing phosphorus. Calcium and magnesium glycerophosphates (see p.1676 and p.1679, respectively) may be considered as a source of calcium or magnesium.

◊ Reference to the use of sodium glycerophosphate as a source of phosphorus in infant parenteral nutrition.[1]

1. Costello I, *et al*. Sodium glycerophosphate in the treatment of neonatal hypophosphataemia. *Arch Dis Child* 1995; **73:** F44–5.

Preparations

Proprietary Preparations (details are given in Part 3)
Austria: Glycophos; ***Fin.:*** Glycophos; ***Gr.:*** Glycophos; ***Hong Kong:*** Glycophos; ***Malaysia:*** Glycophos; ***Neth.:*** Glycophos; ***NZ:*** Glycophos; ***Pol.:*** Glycophos; ***Port.:*** Glycophos; ***Swed.:*** Glycophos; ***Switz.:*** Glycophos; ***UK:*** Glycophos.

Multi-ingredient: ***Arg.:*** Antikatarata†; ***Fr.:*** Biotone†; Ionyl; Phosphore Medifa; Verrulyse-Methionine; ***Israel:*** Babyzim; ***Ital.:*** Calciofix; Glicero-Valerovit; Neuroftal†; Neurol.

Glyceryl Palmitostearate

Glicerol, palmitoestearato de. A mixture of mono-, di-, and triglycerides of C_{16} and C_{18} fatty acids.

CAS — 8067-32-1.

Profile

Glyceryl palmitostearate is used in pharmaceutical manufacturing as a diluent and lubricant for tablets and capsules.

Glycopyrronium Bromide *(BAN, rINN)*

AHR-504; Bromuro de glicopirronio; Glikopironyum Bromür; Glycopyrrolate *(USAN)*; Glycopyrronii bromidum; Glycopyrronium, bromure de; Glykopyrroniumbromid; Glykopyrroniumbromidi. 3-(α-Cyclopentylmandeloyloxy)-1,1-dimethylpyrrolidinium bromide.

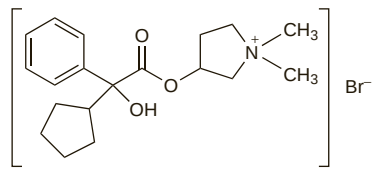
Гликопиррония Бромид

$C_{19}H_{28}BrNO_3$ = 398.3.

CAS — 596-51-0.

ATC — A03AB02.

ATC Vet — QA03AB02.



Pharmacopoeias. In *Chin.* and *US.*
USP 31 (Glycopyrrolate). A white, odourless, crystalline powder. Soluble 1 in 4.2 of water, 1 in 30 of alcohol, 1 in 260 of chloroform, and 1 in 35 000 of ether. Store in airtight containers.

Incompatibility. Glycopyrronium bromide is incompatible with alkalis.

Stability. Investigation of the compatibility of glycopyrronium bromide with infusion solutions and additives showed that the stability of glycopyrronium bromide is questionable above a pH of 6, owing to ester hydrolysis.[1]

1. Ingallinera TS, *et al*. Compatibility of glycopyrrolate injection with commonly used infusion solutions and additives. *Am J Hosp Pharm* 1979; **36:** 508–10. Correction. *ibid.*; 745.

Adverse Effects, Treatment, and Precautions

As for Atropine Sulfate, p.1219.

Renal impairment. A comparison[1] of the pharmacokinetics of intravenous glycopyrronium in 11 uraemic and 7 control patients indicated that the renal elimination of glycopyrronium is considerably prolonged in patients with uraemia. The mean amount of a dose excreted in the urine within 3 hours of a dose was 0.7% in the uraemic patients and 50% in the control patients; 24-hour excretion was 7% and 65%, respectively. The authors concluded that repeated or large doses of glycopyrronium should be avoided or perhaps the drug should not be used in patients with uraemia.

1. Kirvelä M, *et al*. Pharmacokinetics of glycopyrronium in uraemic patients. *Br J Anaesth* 1993; **71:** 437–9.

Interactions

As for Atropine Sulfate, p.1220.

Pharmacokinetics

Glycopyrronium bromide is poorly absorbed from the gastrointestinal tract; about 10 to 25% is absorbed after an oral dose. Glycopyrronium bromide penetrates the blood-brain barrier only poorly. Glycopyrronium is excreted in bile and urine.

◊ References.

1. Kaltiala E, *et al*. The fate of intravenous [H]glycopyrrolate in man. *J Pharm Pharmacol* 1974; **26:** 352–4.
2. Ali-melkkilä TM, *et al*. Pharmacokinetics of IM glycopyrronium. *Br J Anaesth* 1990; **64:** 667–9.
3. Rautakorpi P, *et al*. Pharmacokinetics of glycopyrrolate in children. *J Clin Anesth* 1994; **6:** 217–20.

Uses and Administration

Glycopyrronium bromide is a quaternary ammonium antimuscarinic with peripheral effects similar to those of atropine (p.1219). After intramuscular doses, onset of effects is within 15 to 30 minutes; vagal blocking effects last for 2 to 3 hours and antisialagogue effects persist for up to 7 hours. After intravenous doses, onset of actions occurs within 1 minute.

Glycopyrronium bromide is used similarly to atropine in anaesthetic practice. It has also been used in the iontophoretic treatment of hyperhidrosis and as an adjunct in the treatment of peptic ulcer disease. It is also under investigation for the treatment of chronic moderate to severe drooling in children.

See under headings below for details of dosage in specific indications.

Anaesthesia. Glycopyrronium bromide is given as a premedicant before general anaesthesia (see under Atropine, p.1221) to diminish the risk of vagal inhibition of the heart and to reduce salivary and bronchial secretions. It is given in doses of 200 to 400 micrograms intravenously or intramuscularly before the induction of anaesthesia; alternatively, it may be given in a dose of 4 to 5 micrograms/kg to a maximum of 400 micrograms. If necessary, similar or lower doses may be given intravenously during the operation and repeated if required. A suggested dosage for premedication in neonates is 5 micrograms/kg given intravenously or intramuscularly; doses in children aged 1 month and over are 4 to 8 micrograms/kg up to a maximum of 200 micrograms.

Glycopyrronium bromide is given before or with anticholinesterases to counteract their muscarinic effects when they are used to

reverse the effects of competitive muscle relaxants (see Neostigmine, p.632). The dose is glycopyrronium bromide 200 micrograms intravenously per 1 mg of neostigmine (or per 5 mg of pyridostigmine); alternatively, it may be given in a dose of 10 to 15 micrograms/kg intravenously with neostigmine 50 micrograms/kg. A suggested dosage for neonates and children is 10 micrograms/kg intravenously with neostigmine 50 micrograms/kg. Glycopyrronium bromide can be given mixed in the same syringe with the anticholinesterase, and it has been suggested that greater cardiovascular stability results from use in this way.

Gastrointestinal disorders. Antimuscarinics, including glycopyrronium bromide, have a limited role as antispasmodics (see p.1692), and have been used as adjuncts in the treatment of peptic ulcer disease (see p.1702).

As an adjunct in the treatment of peptic ulcer disease the usual initial dose of glycopyrronium bromide has been 3 to 6 mg daily by mouth in divided doses adjusted according to response to a maximum of 8 mg daily; a maintenance dose of 1 mg twice daily is often adequate. Doses of 100 to 200 micrograms have been given by intramuscular or intravenous injection.

Hyperhidrosis. Adverse effects generally preclude oral use of antimuscarinics for the management of hyperhidrosis (p.1580), but glycopyrronium, has been applied topically as an alternative to aluminium salts.

In studies involving 22 patients with the Frey syndrome (localised flushing and sweating on eating) glycopyrronium bromide as 1 and 2% cream or roll-on solution gave good control of symptoms;[1] patients tended to prefer the roll-on lotion as it was easier to apply. Topical hyoscine as 0.25, 1, or 3% solution or cream also gave control of sweating, but was associated with a much higher incidence of adverse effects. Patients with diabetic gustatory sweating have also noted a reduction in the frequency and severity of episodes after applying glycopyrronium 0.5% cream.[2]

Glycopyrronium bromide has also been used as a 0.05% solution in the iontophoretic treatment of hyperhidrosis.

1. Hays LL, *et al*. The Frey syndrome: a simple, effective treatment. *Otolaryngol Head Neck Surg* 1982; **90:** 419–25.
2. Shaw JE, *et al.* A randomised controlled trial of topical glycopyrrolate, the first specific treatment for diabetic gustatory sweating. *Diabetologia* 1997; **40:** 299–301.

Palliative care. Glycopyrronium bromide is used in palliative care as an alternative to hyoscine to reduce excessive respiratory secretions. A dose of 200 micrograms may be given subcutaneously or intramuscularly every 4 hours. Alternatively, a dose of 0.6 to 1.2 mg may be given by continuous subcutaneous infusion over 24 hours.

Respiratory-tract disorders. Antimuscarinics have potent bronchodilatory activity and some, such as ipratropium (p.1124), may be used in the management of reversible airways obstruction. Glycopyrronium has been studied, although it is not one of the preferred drugs.

References.

1. Schroeckenstein DC, *et al*. Twelve-hour bronchodilation in asthma with a single aerosol dose of the anticholinergic compound glycopyrrolate. *J Allergy Clin Immunol* 1988; **82:** 115–19.
2. Gilman MJ, *et al*. Comparison of aerosolized glycopyrrolate and metaproterenol in acute asthma. *Chest* 1990; **98:** 1095–8.
3. Cydulka RK, Emerman CL. Effects of combined treatment with glycopyrrolate and albuterol in acute exacerbation of chronic obstructive pulmonary disease. *Ann Emerg Med* 1995; **25:** 470–3.

Preparations

USP 31: Glycopyrrolate Injection; Glycopyrrolate Tablets.

Proprietary Preparations (details are given in Part 3)
Arg.: Acpan; ***Austral.:*** Robinul; ***Austria:*** Robinul; ***Belg.:*** Robinul; ***Denm.:*** Robinul; ***Fin.:*** Robinul; ***Ger.:*** Robinul; ***Hong Kong:*** Robinul†; ***Norw.:*** Robinul; ***NZ:*** Robinul; ***S.Afr.:*** Robinul; ***Swed.:*** Robinul; ***UK:*** Robinul; ***USA:*** Robinul.

Multi-ingredient: ***Fin.:*** Gastrodyn comp.

Used as an adjunct in: ***Belg.:*** Robinul-Neostigmine; ***Denm.:*** Robinul-Neostigmin; ***Fin.:*** Glycostigmin; Robinul-Neostigmin; ***Norw.:*** Robinul-Neostigmin; ***Swed.:*** Robinul-Neostigmin; ***Switz.:*** Robinul-Neostigmine; ***UK:*** Robinul-Neostigmine.

Glycyrrhizic Acid

Glycyrrhizin; Glycyrrhizinic Acid.

$C_{42}H_{62}O_{16}$ = 822.9.

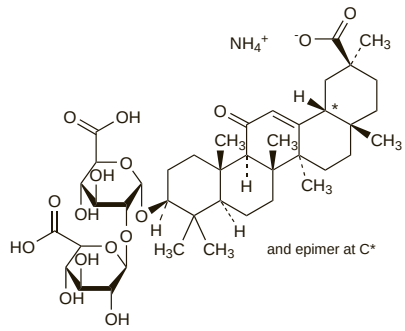
CAS — 1405-86-3.

Ammonium Glycyrrhizate

Ammonii glycyrrhizas; Ammonium, glycyrrhizate d'; Ammonium Glycyrrhizinate; Ammónium-glicirrizát; Ammoniumglycyrrhizat; Ammoniumglykyrritsaatti; Amonio glicirizatas; Amonium-glycyrrhizát; Glycyrram; Monoammonium Glycyrrhizinate.

$C_{42}H_{65}NO_{16}$ = 840.0.

CAS — 53956-04-0.



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

Ph. Eur. 6.2 (Ammonium Glycyrrhizate). A white or yellowish-white, hygroscopic powder. Slightly soluble in water; very slightly soluble in alcohol; practically insoluble in acetone. It dissolves in dilute solutions of acids and of alkali hydroxides. Store in airtight containers.

Dipotassium Glycyrrhizate

Potassium Glycyrrhizinate.

$C_{42}H_{60}K_2O_{16}$ = 899.1.

CAS — 68039-19-0 (potassium glycyrrhizate); 42294-03-1 (monopotassium glycyrrhizate); 68797-35-3 (dipotassium glycyrrhizate);.

Profile

Glycyrrhizic acid is a constituent of liquorice (p.1740). The mild anti-inflammatory and mineralocorticoid properties of liquorice have been attributed to the presence of glycyrrhizic acid and its metabolite glycyrrhetinic acid (Enoxolone, p.50).

Glycyrrhizic acid and its ammonium and potassium salts have been used in products promoted for the relief of coughs, viral infections, and gastrointestinal, liver, and skin disorders. Ammonium glycyrrhizate has also been used as a sweetener, flavour enhancer, and as an emulsifying and gel-forming agent in foodstuffs and cosmetics.

Other derivatives of glycyrrhizic acid discussed elsewhere include metoclopramide glycyrrhizinate (p.1749) and enoxolone (p.50).

Preparations

Proprietary Preparations (details are given in Part 3)
Arg.: Epigen; ***Indon.:*** Neo-Minophagen C; ***Jpn:*** Neo-Minophagen C; ***Mex.:*** Epigen; ***Rus.:*** Epigen (Эпиген).

Multi-ingredient: ***Austria:*** Enicul; ***Fr.:*** Keracnyl stop bouton; Topialyse Fluide; Topialyse Plus; ***Ital.:*** Biothymus DS; ***Jpn:*** Colgen Kowa Bien Soft Mini; ***Mex.:*** Bexident Pediatrics†; ***Port.:*** Alkagin; Bexident.

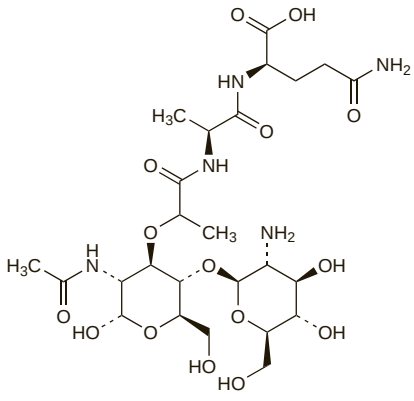
GMDP

Glucosaminylmuramyl Dipeptide. *N*-acetylglucosaminyl-β1-4-*N*-acetylmuramyl-alanyl-D-isoglutamine.

ГМДП

$C_{25}H_{43}N_5O_{15}$ = 653.6.

CAS — 97590-38-0.



Profile

GMDP, a component of bacterial cell walls, is reported to have immunomodulator properties and is used in a wide range of diseases stated to be associated with secondary immunodeficiency.

Preparations

Proprietary Preparations (details are given in Part 3)
Rus.: Licopid (Ликопид).

Gold

Aurum; E175; Or; Oro.

Au = 196.966569.

CAS — 7440-57-5.

Profile

Gold is a bright-yellow, malleable, and ductile metal; the finely divided powder may be black, ruby, or purple. The main use of metallic gold in health care is now in dentistry. Gold may also be used as a colouring agent for some foodstuffs. In the treatment of rheumatoid arthritis, gold is used in the form of compounds such as auranofin (p.25), aurothioglucose (p.26), and sodium aurothiomalate (p.122). The radionuclide gold-198 is described in the chapter on radiopharmaceuticals (p.2053). There have been rare reports of hypersensitivity reactions to metallic gold.

Homoeopathy. Gold has been used in homoeopathic medicines under the following names: Aurum; Aurum met.; Aurum metallicum; Aur. met.

◊ References.

1. Merchant B. Gold, the noble metal and the paradoxes of its toxicology. *Biologicals* 1998; **26:** 49–59.
2. Ehrlich A, Belsito DV. Allergic contact dermatitis to gold. *Cutis* 2000; **65:** 323–6.

Preparations

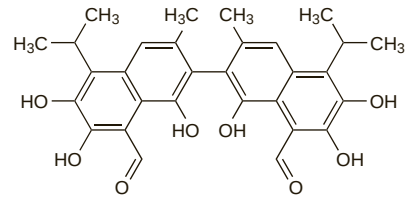
Proprietary Preparations (details are given in Part 3)
Multi-ingredient: ***Ger.:*** Cefassin†.

Gossypol

Gosipol. 2,2′-Bis(1,6,7-trihydroxy-3-methyl-5-isopropylnaphthalene-8-carboxaldehyde).

$C_{30}H_{30}O_8$ = 518.6.

CAS — 303-45-7.



Profile

Gossypol is a pigment extracted from cottonseed oil (p.2288). It possesses antispermatogenic activity and has been studied, especially in China, as a male contraceptive. It has also been investigated for its antineoplastic, antiprotozoal, antiviral, and spermicidal activity and has been studied in women in the treatment of gynaecological disorders.

Adverse effects have included fatigue, changes in appetite, gastrointestinal effects, burning sensation of the face and hands, some loss of libido, and persistent oligospermia. Hypokalaemia has occurred.

◊ The pharmacology and therapeutic potential of gossypol have been reviewed.[1] Although controlled studies[2,3] have shown gossypol to be an effective male contraceptive, WHO concluded[4] that gossypol would not be acceptable as a male antifertility drug because of the occurrence of adverse effects such as hypokalaemia and irreversible testicular damage resulting in azoospermia or severe oligozoospermia.

1. Wu D. An overview of the clinical pharmacology and therapeutic potential of gossypol as a male contraceptive agent and in gynaecological disease. *Drugs* 1989; **38:** 333–41.
2. Coutinho EM, *et al*. Antispermatogenic action of gossypol in men. *Fertil Steril* 1984; **42:** 424–30.
3. Liu G, *et al*. Clinical trial of gossypol as a male contraceptive drug part I: efficacy study. *Fertil Steril* 1987; **48:** 459–61.
4. Waites GMH, *et al*. Gossypol: reasons for its failure to be accepted as a safe, reversible male antifertility drug. *Int J Androl* 1998; **21:** 8–12.

Grape

Grapevine; Rebe; Vigne Rouge; Weinstock.

NOTE. Distinguish from grape bark, Cocillana, p.1554.

Pharmacopoeias. *Fr.* includes Red Vine Extract (Extrait de Vigne Rouge (Sec)), prepared from the leaves.

Profile

The seeds and the leaves of the grape, *Vitis vinifera* (Vitaceae), are used in herbal medicine. The dried fruit (raisins) have laxative and demulcent properties.

Many parts of the plant including the fruit skin, seeds, and leaves are used. Both dietary sources and various extracts are promoted for their antoxidant properties in venous insufficiency and capillary impairment, and it has been suggested that they may protect against atherosclerosis.

A standardised red vine leaf extract (AS-195) has been given for the management of chronic venous insufficiency.