

Polygynax; Polyoph; Terramycin with Polymyxin B; **Hung.**: Ofalmotrim†; Ofalosporin; Polyspor; **India.**: Chlormixin; Dexosyn Plus; Neosporin; Neosporin-H; Ocupol; Ocupol-D; **Indon.**: Immatrol; Isotic Enpi; Isotic Neosporin; Isotic Nefarin; Ketrol; Kloramixin; Kloramixin D; Maxitrol; Nelicort; Neocort; Neofen; Neosyd; Oregan; Osatrol; Otolin; Otopen; Otopraf; Otazambon; Polidemis; Polifrisin; Terramycin Poly; Ximex Optixitrol; **Ir.**: Maxitrol; Neosporin†; Ofalosporin; Polyfax; **Israel.**: Auralcurum; Barmyxin; Desoren; Dex-Otic; Maxitrol; Phenimixin; Tarocidin; Tarocidin D; Terramycin; **Ital.**: Anauran; Cicatrene; Mixotone; Ofalosporin†; Rinjet SF†; **Malaysia.**: Bacitracin-N; Maxitrol; Ofalmotrim; Focin G; Focin H; Terramycin; **Mex.**: Allosol; Biodesin; Biofin; Biotriam; Cortisporin; Dexsol; Hidropolicin; Maxitrol; Neobacigrin; Neosporin; Nicobio†; Polixin; Poly-Micron; Rinadex Compuesto; Septilisin; Sulned; Synalar N; Synalar O; Synalar Ofalmico; Terramycin; Tribiot; **Neth.**: Maxitrol; Ofalosporin; Panotile; Polyspectran G†; Polyttrim; Synalar Bi-Otic†; Terra-Cortril Gel Steraject met polymyxine-B†; Terra-Cortril met polymyxine-B; **Norw.**: Maxitrol; Terra-Cortril Polymyxin B; Terramycin Polymyxin B; **NZ.**: Maxitrol; **Philipp.**: Aplosyn-Otic; BNP Ointment; Cortisporin; Hydrospor; Isonex; Isonex H; Maxirap; Maxitrol; Maxoptic; Neosporin; Novosorin; Postop; Postotic; Predmixin-P; Statrol; Synalar Otic; Syntemax; Terramycin; Terramycin Plus; Trimycin; Trimycin-H; **Pol.**: Atecortin; Dexadent; Maxitrol; Multibiotic; Neotopic; Tribiotic; **Port.**: Conjunctilone; Conjunctilone-S; Ofalmotrim; Ofalosporin; Polisulfade; Polydexa; **Rus.**: Anauran (Анауран); Maxitrol (Макситрол); Polydexa (Полидекс); Polydexa with Phenylephrine (Полидекс с Фенилэфрином); Polygynax (Полигинакс); **S.Afr.**: Maxitrol; Neosporin†; Ofalosporin; Polysporin; Polyttrim†; Terra-Cortril; Terramycin; **Singapore.**: Maxitrol; Polybarmycin; Polydexa; Polygynax; Predmixin-P†; Terramycin; **Spain.**: Bacisporin; Blastoesstimulina; Creanolona; Dermisone Tri Antibiotic; Liquipon Dexa Antib; Maxitrol; Neocones; Ofalmotrim; Ofalmotrim Dexta†; Ofalmowell; Otic; Ofalosporin; Panotile; Phonal; Poly Pred; Pomada Antibiotica; Syntalar Nasal; Synalar Otic; Terra-Cortril; Terramycin; Tivitis; Tulgrasum Antibiotico; Vinciseptil Otic; **Swed.**: Isopto Biotic†; Terracortril med polymyxin B; Terramycin Polymyxin B; **Switz.**: Baneopol; Maxitrol; Mycinopred; Neosporin; Ofalosporin; Panotile; Polydexa; Spersapolymyxin; Terracortril†; **Thai.**: Banocin; Maxitrol; My-B; Neosporin†; Opsacin†; Otosamthong; Ofalosporin†; Polyoph; Predmixin†; Primoptix†; Spersapolymyxin; Terramycin; Terrasil†; Xanalin; **Turk.**: Cebemycin; Geotril; Helks; Neosporin; Ofalmotrim; Polimisin; Polycillin; Polyttrim; Sekamisin; Terramycin; **UK.**: Gregodermt†; Maxitrol; Neosporin; Ofalosporin; Polyfax; Polyttrim†; **USA.**: Ak-Poly-Bac; Ak-Spor; Ak-Trol†; Betadine First Aid Antibiotics + Moisturizer; Betadine Plus First Aid Antibiotics & Pain Reliever; Cortatrigen; Cortimycin; Cortisporin; Dexacidin†; Dexacine†; Dexasporin; Ear-Eze; Lanabiotic†; LazerSporin-C; Maxitrol; Mycitraxine†; Neocin; Neopolydex; Neosporin; Neosporin + Pain Relief; Neosporin GU; Neosporin†; Neotricin HC; Oticair†; Ocu-Spor-B; Ocu-Spor-G; Ocu-Trol; Ocutricin; Otic-Care; OtiTricin; Otobiotic; Otocort; Otomycin-HPN; Ofalosporin; Pediotic; Poly-Dex; Poly-Pred; Polycin-B; Polymycin; Polysporin†; Polytacin; Polyttrim; Spectrocin Plus†; Terak; Terramycin with Polymyxin B; Tri-Biozene; UAD-Otic; **Venez.**: Dermabiotic; Maxicort; Maxitrol; Neo-Synalar†; Offerra; Ofalosporin; Ofalmotrim; Terramycin con Polimixina B.

## Pristinamycin (BAN, rINN)

Pristinamicina; Pristinamycine; Pristinamycinum; RP-7293.

Пристинамицин

CAS — 270076-60-3.

ATC — J01FG01.

ATC Vet — QJ01FG01.

## Profile

Pristinamycin is a streptogramin antibacterial produced by the growth of *Streptomyces pristina spiralis*, with actions and uses similar to those of virginiamycin (p.361). It is given orally in the treatment of susceptible infections, particularly staphylococcal infections, in a dose of 2 to 4 g daily in divided doses.

◇ Pristinamycin is a naturally occurring mixture of two synergistic components, pristinamycin I which is a macrolide, and pristinamycin II which is a depsipeptide.<sup>1</sup> It has been available for many years as an oral antistaphylococcal drug, and also acts against streptococci. It is effective against strains showing resistance to erythromycin; resistance to pristinamycin is rare,<sup>2,3</sup> although resistance in staphylococci has been reported in the past.<sup>4,5</sup> It is effective against methicillin-resistant *Staphylococcus aureus* (MRSA)<sup>6,7</sup> but its usefulness in severe infection is limited by its poor solubility, which prevents development of an intravenous formulation. Oral pristinamycin has been shown to be as effective as standard therapy with intravenous then oral penicillin in the treatment of erysipelas.<sup>8</sup>

Mixtures of water-soluble derivatives of pristinamycins I and II, such as quinupristin/dalfopristin (p.322), are in clinical use or under investigation.

- Hamilton-Miller JMT. From foreign pharmacopoeias: 'new' antibiotics from old? *J Antimicrob Chemother* 1991; **27**: 702–5.
- Weber P. Streptococcus pneumoniae: absence d'émergence de résistance à la pristinamycine. *Pathol Biol (Paris)* 2001; **49**: 840–5.
- Leclercq R, et al. Activité in vitro de la pristinamycine vis-à-vis des staphylocoques isolés dans les hôpitaux français en 1999–2000. *Pathol Biol (Paris)* 2003; **51**: 400–4.
- Loncle V, et al. Analysis of pristinamycin-resistant *Staphylococcus epidermidis* isolates responsible for an outbreak in a Parisian hospital. *Antimicrob Agents Chemother* 1993; **37**: 2159–65.
- Allignet J, et al. Distribution of genes encoding resistance to streptogramin A and related compounds among staphylococci resistant to these antibiotics. *Antimicrob Agents Chemother* 1996; **40**: 2523–8.
- Dancer SJ, et al. Oral streptogramins in the management of patients with methicillin-resistant *Staphylococcus aureus* (MRSA) infections. *J Antimicrob Chemother* 2003; **51**: 731–5.
- Ng J, Gosbell IB. Successful oral pristinamycin therapy for osteoarticular infections due to methicillin-resistant *Staphylococcus aureus* (MRSA) and other *Staphylococcus* spp. *J Antimicrob Chemother* 2005; **55**: 1008–12.
- Bernard P, et al. Oral pristinamycin versus standard penicillin regimen to treat erysipelas in adults: randomised, non-inferiority, open trial. *BMJ* 2002; **325**: 864–6.

The symbol † denotes a preparation no longer actively marketed

## Preparations

**Proprietary Preparations** (details are given in Part 3)

**Fr.**: Pyostacine; **Israel**: Pyostacine.

## Procaine Benzylpenicillin (BAN, rINN)

Benzylpenicillinprokain; Bentsylipenisilliniprokaini; Benzylpenicillin prokainas; Benzylpenicillin-prokain; Benzylpenicillina prokainowa; Benzylpenicillin Novocaine; Benzylpénicilline Procaine; Benzylpenicillinum procainum; Penicillin G Procaine; Procaína benzilpenicilina; Procaine Benzylpénicilline; Procaine Penicillin G; Procaïne Benzylpenicillinum; Procaïnum Benzylpenicillinum; Prokain Benzylpenisilin; Prokain Penisilin G; Prokain-benzylpenicillin. 2-(4-Aminobenzoyloxy)ethylthiethylammonium (6R)-6-(2-phenylacetamido)penicillanate monohydrate.

Прокаин Бензилпенициллин

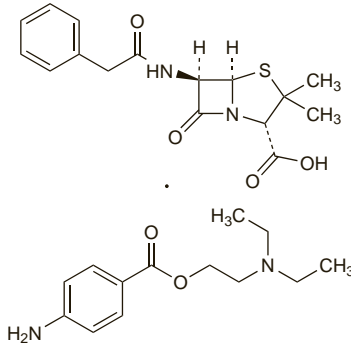
C<sub>13</sub>H<sub>20</sub>N<sub>2</sub>O<sub>2</sub>·C<sub>16</sub>H<sub>18</sub>N<sub>2</sub>O<sub>4</sub>S·H<sub>2</sub>O = 588.7.

CAS — 54-35-3 (anhydrous procaine benzylpenicillin);

6130-64-9 (procaine benzylpenicillin monohydrate).

ATC — J01CE09.

ATC Vet — QJ01CE09; QJ51CE09.



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

**Ph. Eur.** 6.2 (Benzylpenicillin, Procaine). A white or almost white, crystalline powder. Slightly soluble in water; sparingly soluble in alcohol. A 0.33% solution in water has a pH of 5.0 to 7.5. Store in airtight containers.

**USP** 31 (Penicillin G Procaine). White crystals or white, very fine, microcrystalline powder, odourless or practically odourless. Slightly soluble in water; soluble in alcohol and in chloroform. It is rapidly inactivated by acids, by alkali hydroxides, and by oxidising agents. pH of a saturated solution in water is between 5.0 and 7.5.

## Adverse Effects and Precautions

As for Benzylpenicillin, p.213.

Procaine benzylpenicillin should not be given to patients known to be hypersensitive to either of its components. Procaine benzylpenicillin should not be injected intravascularly since ischaemic reactions may occur.

Severe, usually transient, reactions with symptoms of severe anxiety and agitation, confusion, psychotic reactions including visual and auditory hallucinations, seizures, tachycardia and hypertension, cyanosis, and a sensation of impending death have occasionally been reported with procaine benzylpenicillin and may be due to accidental intravascular injection. Since similar reactions have also occurred with other depot penicillin preparations that do not contain procaine, its presence is unlikely to be the major cause of such reactions, but may be a contributory factor, especially after injection of high doses. These reactions have been termed non-allergic, pseudoallergic, pseudoanaphylactic, or Hoigne's syndrome; the term 'embolic-toxic reaction' has also been proposed.

## Interactions

As for Benzylpenicillin, p.214.

## Pharmacokinetics

When procaine benzylpenicillin is given by intramuscular injection, it forms a depot from which it is slowly released and hydrolysed to benzylpenicillin. Peak plasma concentrations are produced in 1 to 4 hours, and

effective concentrations of benzylpenicillin are usually maintained for 12 to 24 hours. However, plasma concentrations are lower than those after an equivalent dose of benzylpenicillin potassium or sodium.

Distribution into the CSF is reported to be poor.

## Uses and Administration

Procaine benzylpenicillin has the same antimicrobial action as benzylpenicillin (p.214) to which it is hydrolysed gradually following deep intramuscular injection. This results in a prolonged effect, but because of the relatively low blood concentrations produced, its use should be restricted to infections caused by microorganisms that are highly sensitive to penicillin. Procaine benzylpenicillin should not be used as the sole treatment for severe acute infections, or when bacteraemia is present.

Procaine benzylpenicillin is used mainly in the treatment of syphilis; other indications have included pneumonia (in children in developing countries), and Whipple's disease. For details of these infections and their treatment, see under Choice of Antibacterial, p.162.

**Administration and dosage.** Doses of procaine benzylpenicillin may sometimes be expressed in terms of equivalent units of benzylpenicillin. Procaine benzylpenicillin 600 mg is equivalent to about 360 mg of benzylpenicillin (600 000 units). Procaine benzylpenicillin is given by deep intramuscular injection in usual doses of 0.6 to 1.2 g daily.

Patients with syphilis are given procaine benzylpenicillin 1.2 g daily for 10 to 14 days; infants up to 2 years of age with congenital syphilis may be given 50 mg/kg daily. Treatment may be continued for 3 weeks in patients with late syphilis.

Procaine benzylpenicillin is also used in combined preparations with other penicillins, including benzylpenicillin and benzathine benzylpenicillin.

## Preparations

**USP** 31: Penicillin G Benzathine and Penicillin G Procaine Injectable Suspension; Penicillin G Procaine for Injectable Suspension; Penicillin G Procaine Injectable Suspension.

**Proprietary Preparations** (details are given in Part 3)

**Arg.**: Mudapenil†; Penicil Dermol†; **Austral.**: Cilicaine Syringe; **Cz.**: Penderpon Compositum; **Ger.**: Jenacillin O†; **Hung.**: Retardillin; **Mex.**: Benzotropen; Farmabep; Promizol; Sodilin; Unil 3†; Unil 6.33; **NZ.**: Cilicaine; **S.Afr.**: Bio-Gillin; Novocillin†; Proclillin; **Spain.**: Aquicilina; Farmaprina; **Turk.**: Benzapen 6.33; Deposilin 6.33; Devapen; Iceliline; Penadur 6.33; Penkain-K; Proclillin; **USA.**: Crysticillin; **Venez.**: Rebencil†; Pronapen; Silcopent†.

**Multi-ingredient:** **Austria.**: Fortepen; Retarpen compositum; **Braz.**: Benapen; Benzapen G; Despacilina; Drenovac†; Expectovac†; Ginurovac†; Infocillin†; Odontovac†; Ortocillin†; Pencil 400; Penkaron; Wycillin; **Chile.**: Karbasalin†; **Ger.**: Bipensar; Jenacillin A†; Retacillin compositum; **Hong Kong.**: Penicillin G Procaine Fortified; **Hung.**: Prompticillin Forte; **India.**: Bistrepin; **Ital.**: Tri-Vvycillin†; **Mex.**: Bencelin Combinado; Benzanil Composito; Benzetacil Combinado; Hidroclina; Lugaxil; Pecivax; Pendiben Composito; Penicil; Penipot; Penisodina; Penprocilina; Proclilin; Respicil; Robencaxil; Suipen; **Neth.**: Penidural D/F†; **Port.**: Atracilina; Lentocilin; Penadur 6.33†; **Rus.**: Bicillin-3 (Бициллин-3); Bicillin-5 (Бициллин-5); **S.Afr.**: Penilente Forte†; Ultracilin; **Spain.**: Aquicilina D A; Benzetacil Composito; Cepacilina 633; **USA.**: Bicillin C-R; **Venez.**: Benzetacil 3-3; Benzetacil 6-3-3.

## Propicillin Potassium (BANM, pINN)

Kalii Propicillinum; Potassium α-Phenoxypropylpenicillin; Propicilina potásica; Propicilline Potassique; Propicillinum Kalicum. A mixture of the D(+) and L(–) isomers of potassium (6R)-6-(2-phenoxybutyramido)penicillanate.

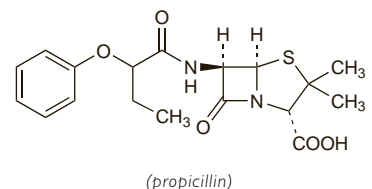
Калия Пропициллин

C<sub>18</sub>H<sub>21</sub>KN<sub>2</sub>O<sub>5</sub>S = 416.5.

CAS — 551-27-9 (propicillin); 1245-44-9 (propicillin potassium).

ATC — J01CE03.

ATC Vet — QJ01CE03.



(propicillin)