Interactions

As for Cefalexin, p. 234.2.

Antimicrobial Action

Cefprozil is bactericidal and has a similar but wider range of antimicrobial activity than cefaclor (p. 233.1).

Pharmacokinetics

Cefprozil is well absorbed from the gastrointestinal tract with a reported bioavailability of 90 to 95%. Oral doses of 0.25, 0.5, and 1 g produce peak plasma concentrations of about 6, 10, and 18 micrograms/mL respectively at 1 to 2 hours. The presence of food is reported to have little or no effect on the absorption of cefprozil. A plasma half-life of 1 to 1.4 hours has been reported; it is increased in patients with renal impairment, up to about 6 hours in those with end-stage renal failure. About 35 to 45% of cefprozil is bound to plasma proteins.

Cefprozil is widely distributed in the body tissues. Concentrations of cefprozil in tonsillar and adenoidal tissue are reported to be about 40 to 50% of those in plasma, and less than 0.3% of a 1-g dose has been recovered in breast milk in 24 hours. About 60% of a dose is excreted unchanged in the urine in the first 8 hours by glomerular filtration and tubular secretion. Concentrations of cefprozil of 700, 1000, and 2900 micrograms/mL have occurred in the urine within 4 hours of doses of 0.25, 0.5, and 1 g respectively. Some cefprozil is removed by haemodialysis.

Preparations

Proprietary Preparations (details are given in Volume B)

Single-ingredient Preparations. ***Arg.***: Ceprof†; ***Braz.***: Cefzil; ***Canad.***: Cefzil; ***China***: Cefzil (施复捷); Kai Ke Zhi (凯可之); Xi Neng (希能); Yinlishu (银力舒); Yuanrui (元锐); ***Cz.***: Cefzil; ***Gr.***: Cefgram; Cefipra; Cefium; Cefpro; Cefzil; Cepius; Gramium; Mycoterb; Natrofen; Pricefil; Procef; Prozidil; Sanocef; Teliomon; Top 1; Tricef; Zamalin; ***Hong Kong***: Procef†; ***Hung.***: Cefzil; ***India***: Orprozil; Refzil-O; ***Indon.***: Cefzil†; Lizor; ***Ital.***: Cronocef; Procef†; Rozicel†; ***Mex.***: Procef; ***Philipp.***: Procef†; ***Pol.***: Cefzil†; ***Port.***: Procef; Radacefe; ***S.Afr.***: Auroprozil; Prozef; ***Singapore***: Procef; ***Spain***: Brisoral†; ***Switz.***: Procef; ***Thai.***: Procef†; ***Turk.***: Erasef; Prefix; Serozil; ***Venez.***: Procef.

Pharmacopoeial Preparations

USP 36: Cefprozil for Oral Suspension; Cefprozil Tablets.

Cefquinome Sulfate *(BANM, USAN, rINNM)*

Cefquinoma, sulfato de; Cefquinome, Sulfate de; Cefquinome Sulphate; Cefquinomi Sulfas; HR-111V; Sulfato de cefquinoma; Цефхинома Сульфат.

{6*R*-[6α,7β(*Z*)]}-1-[(7-{[(2-amino-4-thiazolyl)-(methoxyimino) acetyl]amino}-2-carboxy-8-oxo-5-thia-1-azabicyclo[4.2.0]oct-2-en-3-yl)methyl]-5,6,7,8,-tetrahydroquinolinium sulfate (1:1).

$C_{23}H_{24}N_6O_5S_2.H_2SO_4$=626.7

CAS — 84957-30-2 (cefquinome); 118443-89-3 (cefquinome sulfate); 123766-80-3 (cefquinome sulfate).

UNII — 3858K104DQ.

Profile

Cefquinome is a fourth-generation cephalosporin antibacterial used as the sulfate in veterinary medicine.

Cefradine *(BAN, rINN)*

Cefradin; Cefradina; Cefradinas; Céfradine; Cefradinum; Cefradyna; Cephradine (USAN); Cephradine; Kefradiini; Sefradin; SKF-D-39304; SQ-11436; SQ-22022 (cefradine dihydrate); Цефрадин.

(7*R*)-7-(α-D-Cyclohexa-1,4-dienylglycylamino)-3-methyl-3-cephem-4-carboxylic acid.

$C_{16}H_{19}N_3O_4S$=349.4

CAS — 38821-53-3 (anhydrous cefradine); 31828-50-9 (non-stoichiometric cefradine hydrate); 58456-86-3 (cefradine dihydrate).

ATC — J01DB09.

ATC Vet — QJ01DB09.

UNII — F1BC02I72W (cefradine); 9YA6SX5S4D (anhydrous cefradine); FUC0D71IZN (cefradine monohydrate); 56PPJ9MMPE (cefradine dihydrate).

Pharmacopoeias. In *Chin.*, *Eur.* (see p. vii), and *US* (which allows the anhydrous form, the monohydrate, or the dihydrate).

Ph. Eur. 8: (Cefradine). A white or slightly yellow, hygroscopic powder. Sparingly soluble in water; practically insoluble in alcohol and in *n*-hexane. A 1% solution in water has a pH of 3.5 to 6.0. Store at 2 degrees to 8 degrees in airtight containers. Protect from light.

USP 36: (Cephradine). A white to off-white crystalline powder. Sparingly soluble in water; very slightly soluble in alcohol and in chloroform; practically insoluble in ether. pH of a 1% solution in water is between 3.5 and 6.0. Store in airtight containers.

Incompatibility and stability. Commercially available injections contain sodium carbonate or arginine as neutralisers. Injections containing sodium carbonate are incompatible with solutions such as compound sodium lactate injection that contain calcium salts.

References.

1. Wang Y-C J, Monkhouse DC. Solution stability of cephradine neutralized with arginine or sodium bicarbonate. *Am J Hosp Pharm* 1983; **40:** 432.
2. Mehta AC, *et al.* Chemical stability of cephradine injection solutions. *Intensive Therapy Clin Monit* 1988; **9:** 195–6.

Uses and Administration

Cefradine is a first-generation cephalosporin antibacterial given orally or by the parenteral route in the treatment of infections caused by susceptible Gram-positive and Gram-negative bacteria (including infections of the respiratory and urinary tracts, bones and joints, and of the skin and skin structure) and for surgical infection prophylaxis. For details of these infections and their treatment, see under Choice of Antibacterial, p. 172.2.

Cefradine is given orally in doses of 1 to 2 g daily in 2 to 4 divided doses; up to 4 g daily may be given by this route. It may be given parenterally, by deep intramuscular injection or intravenously by slow injection over 3 to 5 minutes or by intermittent or continuous infusion, in doses of 2 to 4 g daily in 4 divided doses; up to 8 g daily may be given parenterally.

For surgical infection prophylaxis, 1 to 2 g may be given pre-operatively by intramuscular or intravenous injection; subsequent parenteral or oral doses are given as appropriate.

The dose of cefradine may need to be reduced in patients with renal impairment, see also p. 251.2.

For details of doses in children, see also p. 251.2.

Administration in children. Cefradine may be given to children for the treatment of infections caused by susceptible Gram-positive and Gram-negative bacteria. It is given orally, by intramuscular injection, or intravenously by slow injection over 3 to 5 minutes or intermittent or continuous infusion. The usual oral dose is 25 to 50 mg/kg daily in 2 or 4 divided doses; for otitis media 75 to 100 mg/kg daily in divided doses every 6 to 12 hours (to a maximum of 4 g daily) may be given. Cefradine is given parenterally in a dose of 50 to 100 mg/kg daily in 4 divided doses, increasing to 200 to 300 mg/kg daily in severe infections.

Although not licensed in the UK, for the prevention of *Staphylococcus aureus* lung infection in children with cystic fibrosis the *BNFC* recommends that those aged 7 years and older may be given an oral dose of 2 g twice daily.

Administration in renal impairment. Doses of cefradine should be reduced in patients with severe renal impairment. The following oral and parenteral doses are recommended in UK licensed product information according to creatinine clearance (CC):

- CC more than 20 mL/minute: 500 mg every 6 hours
- CC 5 to 20 mL/minute: 250 mg every 6 hours
- CC less than 5 mL/minute: 250 mg every 12 hours

Patients undergoing chronic, intermittent haemodialysis may be given a 250-mg dose at the start of the session, repeated after 6 to 12 hours, then again 36 to 48 hours after the initial dose, and again at the start of the next haemodialysis if more than 30 hours have elapsed since the previous dose.

Further dosage modification may be required in children with renal impairment.

Adverse Effects and Precautions

As for Cefalexin, p. 234.2. Intramuscular injections of cefradine can be painful and thrombophlebitis has occurred on intravenous injection.

Interactions

As for Cefalexin, p. 234.2.

Antimicrobial Action

As for Cefalexin, p. 234.2.

Pharmacokinetics

Cefradine is rapidly and almost completely absorbed from the gastrointestinal tract after oral doses. Doses of 0.25, 0.5, and 1 g given orally have produced peak plasma concentrations of about 9, 17, and 24 micrograms/mL respectively at 1 hour and are similar to those achieved with cefalexin. Absorption is delayed by the presence of food although the total amount absorbed is not appreciably altered. After intramuscular injection peak plasma concentrations of about 6 and 14 micrograms/mL have occurred within 1 to 2 hours of doses of 500 mg and 1 g respectively.

Only about 8 to 12% is reported to be bound to plasma proteins. A plasma half-life of about 1 hour has been reported; this is prolonged in patients with renal impairment. Cefradine is widely distributed to body tissues and fluids, but does not enter the CSF in significant quantities. Therapeutic concentrations occur in the bile. It crosses the placenta into the fetal circulation and is distributed in small amounts into breast milk.

Cefradine is excreted unchanged in the urine by glomerular filtration and tubular secretion, over 90% of an oral dose or 60 to 80% of an intramuscular dose being recovered within 6 hours. Peak urinary concentrations of about 3 mg/mL have been achieved after a 500-mg oral dose. Probenecid delays excretion.

Cefradine is removed by haemodialysis and peritoneal dialysis.

References.

1. Wise R. The pharmacokinetics of the oral cephalosporins—a review. *J Antimicrob Chemother* 1990; **26** (suppl E): 13–20.
2. Schwinghammer TL, *et al.* Pharmacokinetics of cephradine administered intravenously and orally to young and elderly subjects. *J Clin Pharmacol* 1990; **30:** 893–9.

Preparations

Proprietary Preparations (details are given in Volume B)

Single-ingredient Preparations. ***Belg.***: Velosef†; ***China***: Di La (迪拉); Kebili (克必力); Saifuding (赛福定); Shen You (申优); Taiding (泰迪定); Velosef (泛捷复); Xianyi (先宜); Xindadelei (新达德雷); ***Fr.***: Dexef; Kelsef†; Zeefra†; ***Gr.***: Ampisodex; Amritacicl; Bionovium; Nipredin; Opebrin; Sporobiotic; Tracilarin; Velosef; Vethisel; ***Hong Kong***: Qualisef; Veloseft; Zeefra†; ***Indon.***: Dynacef; Lovecef†; Velodine; Velodrom; Veloseft; ***Irl.***: Veloseft; ***Ital.***: Ecosporina; ***Mex.***: Veracef; ***Philipp.***: Altozef; Cefralon; Gramcep; Medrin; Racep; Sedinef; Senadex; Solphride; Tolzep†; Vamosef; Velodyne; Yudinef; Zefadin; Zepdril; Zolicef; ***Pol.***: Tafril; ***Port.***: Biocefra; Cefalmin; Cefradur; ***S.Afr.***: Cefril†; ***Spain***: Septacef†; Velocef†; ***UAE***: Eskacef†; Julphacef; ***UK***: Nicef; Veloseft; ***Venez.***: Veracef.

Pharmacopoeial Preparations

BP 2014: Cefradine Capsules; Cefradine Injection; Cefradine Oral Suspension;

USP 36: Cephradine Capsules; Cephradine for Injection; Cephradine for Oral Suspension; Cephradine Tablets.

Cefsulodin Sodium *(BANM, USAN, rINNM)*

Abbott-46811; Cefsulodina sódica; Cefsulodine Sodique; Cefsulodinnatrium; Cefsulodinum Natricum; CGP-7174E; Kefsulodiininatrium; Natrii Cefsulodinum; SCE-129; Sulcephalosporin Sodium; Натрий Цефсулодин.

Sodium 3-(4-carbamoylpyridiniomethyl)-7-[(2*R*)-2-phenyl-2-sulphoacetamido]-3-cephem-4-carboxylate.

$C_{22}H_{19}N_4NaO_8S_2$=554.5

CAS — 62587-73-9 (cefsulodin); 52152-93-9 (cefsulodin sodium).

ATC — J01DD03.

ATC Vet — QJ01DD03.

UNII — 2D087186PY.

Pharmacopoeias. In *Jpn*.

Uses and Administration

Cefsulodin is a third-generation cephalosporin antibacterial with a narrow spectrum of activity that has been used similarly to ceftazidime (p. 253.1) for the treatment of infections caused by susceptible strains of *Pseudomonas aeruginosa*.

It is given as the sodium salt by intravenous injection. Doses are expressed in terms of the equivalent amount of cefsulodin; 1.04 g of cefsulodin sodium is equivalent to about 1 g of cefsulodin. The usual adult dose is 6 g daily in 4 divided doses; in less severe infections daily doses of 3 to 4 g may be given.

For details of doses in children and in those with renal impairment, see p. 251.3.

Administration in children. Cefsulodin may be given to children for the treatment of infections caused by susceptible organisms, in particular *Pseudomonas aeruginosa*. Children may be given an intravenous dose of 100 mg/kg daily; 50 mg/kg daily may be given in less severe infections.

Administration in renal impairment. The dosage of cefsulodin given intravenously should be adjusted in patients with renal impairment according to creatinine clearance (CC):

- CC 20 to 50 mL/minute: a loading dose of 1.5 g then 1 g every 8 hours