Cefazolin *(BAN, pINN)*

Cefazolina; Céfazoline; Cefazolinum; Cephazolin; Kefatsoliini; Sefazolin. 3-[(5-Methyl-1,3,4-thiadiazol-2-yl)thiomethyl]-7-(tetrazol-1-ylacetamido)-3-cephem-4-carboxylic acid.

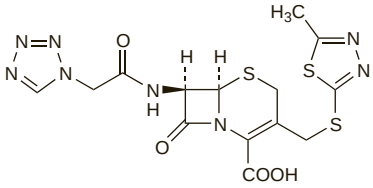
Цефазолин

$C_{14}H_{14}N_8O_4S_3$ = 454.5.

CAS — 25953-19-9.

ATC — J01DB04.

ATC Vet — QJ01DB04; QJ51DA04.



Pharmacopoeias. In *US*.

USP 31 (Cefazolin). A white to slightly off-white, odourless crystalline powder. Slightly soluble in water, in alcohol, and in methyl alcohol; sparingly soluble in acetone; practically insoluble in chloroform, in dichloromethane, in ether, and in benzene; soluble in dimethylformamide and in pyridine; very slightly soluble in ethyl acetate, in isopropyl alcohol, and in methyl isobutyl ketone. Store in airtight containers.

Cefazolin Sodium *(BANM, USAN, pINNM)*

46083; Cefazolin sodná sůl; Cefazolina sódica; Céfazoline sodique; Cefazolinnatrium; Cefazolin-nátrium; Cefazolino natrio druska; Cefazolinum natricum; Cephazolin Sodium; Kefatsoliininatrium; Natrii Cefazolinum; Sefazolin Sodyum; SKF-41558.

Натрий Цефазолин

$C_{14}H_{13}N_8NaO_4S_3$ = 476.5.

CAS — 27164-46-1.

ATC — J01DB04.

ATC Vet — QJ01DB04.

Pharmacopoeias. In *Chin.*, *Eur.* (see p.vii), *Jpn*, and *US*. *Jpn* also includes the pentahydrate.

Ph. Eur. 6.2 (Cefazolin Sodium). A white or almost white, very hygroscopic powder. It exhibits polymorphism. Freely soluble in water; very slightly soluble in alcohol. A 10% solution in water has a pH of 4.0 to 6.0. Store in airtight containers. Protect from light.

USP 31 (Cefazolin Sodium). A white to off-white, practically odourless, crystalline powder, or a white to off-white solid. Freely soluble in water, in sodium chloride 0.9%, and in glucose solutions; very slightly soluble in alcohol; practically insoluble in chloroform and in ether. pH of a solution in water containing the equivalent of cefazolin 10% is between 4.0 and 6.0. Store in airtight containers.

Incompatibility and stability. Cefazolin sodium has been reported to be incompatible with aminoglycosides and many other drugs. When the pH of a solution exceeds 8.5 there may be hydrolysis and when it is below 4.5 insoluble cefazolin may be precipitated.

References.

1. Nahata MC, Ahalt PA. Stability of cefazolin sodium in peritoneal dialysis solutions. *Am J Hosp Pharm* 1991; **48:** 291–2.
2. Wu C-C, *et al.* Stability of cefazolin in heparinized and nonheparinized peritoneal dialysis solutions. *Am J Health-Syst Pharm* 2002; **59:** 1537–8.
3. Lin Y-F, *et al.* Stability of cefazolin sodium in icodextrin-containing peritoneal dialysis solution. *Am J Health-Syst Pharm* 2002; **59:** 2362, 2364.

Adverse Effects and Precautions

As for Cefalotin Sodium, p.219. Stevens-Johnson syndrome has occurred.

Like cephalosporins with an *N*-methylthiotetrazole side-chain, cefazolin has been associated with hypoprothrombinaemia.

Breast feeding. In a study[1] of 20 lactating women receiving cefazolin, the amount of cefazolin in breast milk was found to be extremely small (equivalent to less than 0.075% of the dose). No adverse effects have been seen in breast-fed infants whose mothers were receiving cefazolin, and the American Academy of Pediatrics considers[2] that it is therefore usually compatible with breast feeding.

1. Yoshioka H, *et al.* Transfer of cefazolin into human milk. *J Pediatr* 1979; **94:** 151–2.
2. American Academy of Pediatrics. The transfer of drugs and other chemicals into human milk. *Pediatrics* 2001; **108:** 776–89. Correction. *ibid.*; 1029. Also available at: http://aappolicy.aappublications.org/cgi/content/full/pediatrics%3b108/3/776 (accessed 25/05/04)

Effects on the nervous system. References.

1. Manzella JP, *et al.* CNS toxicity associated with intraventricular injection of cefazolin: report of three cases. *J Neurosurg* 1988; **68:** 970–1.
2. Martin ES, *et al.* Seizures after intraventricular cefazolin administration. *Clin Pharm* 1992; **11:** 104–5.

Sodium content. Each g of cefazolin sodium contains about 2.1 mmol of sodium.

Interactions

Cefazolin contains a methylthiadiazolethiol side-chain; like cephalosporins containing the related *N*-methylthiotetrazole side-chain (see Cefamandole, p.221), it may have the potential to cause a disulfiram-like reaction with alcohol, and enhance the effects of warfarin.

The renal excretion of cefazolin and many other cephalosporins is delayed by probenecid.

Antimicrobial Action

As for Cefalotin Sodium, p.220, although cefazolin is more sensitive to staphylococcal beta-lactamase.

Pharmacokinetics

Cefazolin is poorly absorbed from the gastrointestinal tract and is given by the intramuscular or intravenous routes. After a 500-mg dose given intramuscularly, peak plasma concentrations of 30 micrograms or more per mL are obtained after 1 hour. About 85% of cefazolin is bound to plasma proteins. The plasma half-life of cefazolin is about 1.8 hours, and is increased in patients with renal impairment. Cefazolin diffuses into bone and into ascitic, pleural, and synovial fluid but not appreciably into the CSF. It crosses the placenta; only low concentrations are detected in breast milk.

Cefazolin is excreted unchanged in the urine, mainly by glomerular filtration with some renal tubular secretion, at least 80% of a dose given intramuscularly being excreted within 24 hours. Peak urine concentrations of more than 2 and 4 mg/mL have been reported after intramuscular doses of 0.5 and 1 g respectively. Probenecid delays excretion. Cefazolin is removed to some extent by haemodialysis.

High biliary concentrations have been reported, although the amount excreted by this route is small.

Uses and Administration

Cefazolin is a first-generation cephalosporin antibacterial used to treat infections due to susceptible organisms, including biliary-tract infections, endocarditis (staphylococcal), and peritonitis (associated with continuous ambulatory peritoneal dialysis). It is also used for surgical infection prophylaxis, including prophylaxis of endometritis at caesarean section. For details of these infections and their treatment, see under Choice of Antibacterial, p.162.

Administration and dosage. Cefazolin is given as the sodium salt by deep intramuscular injection, by slow intravenous injection over 3 to 5 minutes, or by intravenous infusion. Doses are expressed in terms of the equivalent amount of cefazolin; 1.05 g of cefazolin sodium is equivalent to about 1 g of cefazolin. The usual adult dose is the equivalent of 0.5 to 1 g of cefazolin every 6 to 12 hours. The usual maximum daily dose is 6 g, although up to 12 g has been used in severe life-threatening infections. Children over 1 month of age may be given 25 to 50 mg/kg daily in 3 or 4 divided doses, increased in severe infections to a maximum of 100 mg/kg daily.

For the prophylaxis of infection during surgery, a 1-g dose is given half to one hour before the operation, followed by 0.5 to 1 g during surgery for lengthy procedures. A dose of 0.5 to 1 g is given every 6 to 8 hours postoperatively for 24 hours, or up to 5 days in certain cases.

For details of reduced doses of cefazolin in patients with renal impairment, see below.

Other routes used for cefazolin sodium include intraperitoneal use in peritoneal dialysis solutions, and intra-ocular injection.

In some countries a modified-release intramuscular formulation of cefazolin sodium with the less soluble dibenzylamine salt of cefazolin, in the ratio of 1:4, has been used.

Administration in renal impairment. Dosage of cefazolin should be reduced in patients with renal impairment and various modifications have been recommended. After a loading dose the licensed product information suggests the following doses based on creatinine clearance (CC):

Adults

- CC 55 mL or more per minute: usual doses
- CC 35 to 54 mL/minute: usual doses but at intervals of at least 8 hours
- CC 11 to 34 mL/minute: half the usual dose every 12 hours
- CC 10 mL or less per minute: half the usual dose every 18 to 24 hours

Children

- CC 40 to 70 mL/minute: 60% of the normal daily dose in 2 divided doses
- CC 20 to 40 mL/minute: 25% of the normal daily dose in 2 divided doses
- CC 5 to 20 mL/minute: 10% of the normal daily dose every 24 hours.

One report[1] indicated that, for patients on long-term haemodialysis, a dose of 20 mg/kg given 3 times weekly after dialysis maintained therapeutic cefazolin concentrations.

1. Ahern JW, *et al.* Cefazolin dosing protocol for patients receiving long-term hemodialysis. *Am J Health-Syst Pharm* 2003; **60:** 178–81.

Preparations

BP 2008: Cefazolin Injection;
USP 31: Cefazolin for Injection; Cefazolin Injection; Cefazolin Ophthalmic Solution.

Proprietary Preparations (details are given in Part 3)
Arg.: Cefalomicina; Cefamezin; ***Austral.:*** Kefzol; ***Austria:*** Kefzol; Servazolin; Zolicef; ***Belg.:*** Cefacidal; Kefzol†; ***Braz.:*** Ceftrat; Cezolin†; Duocef; Fazolon; Kefazol; Zolin†; ***Canad.:*** Kefzol†; ***Chile:*** Kefzol†; ***Cz.:*** Kefzol†; Orizolin†; Vulmizolin; ***Fr.:*** Cefacidal†; ***Ger.:*** Basocef; Elzogram†; ***Gr.:*** Biozolin†; Vifazolin; ***Hong Kong:*** Cefamezin; ***Hung.:*** Totacef†; ***India:*** Azolin; Reflin; Zolfin†; ***Indon.:*** Biozolin; Cefazol; ***Israel:*** Cefamezin; Kefazin; Kefzol†; Totacef†; ***Ital.:*** Acef; Cefabiozim†; Cefamezin; Cefazil; Cromezin; Nefazol; Recef; Sicef; Silzolin†; Totacef; ***Jpn:*** Cefamezin; Otsuka Cez; ***Mex.:*** Cefacidal†; ***Neth.:*** Cefacidal; Cefamezin; Kefzol; Servazolin; ***NZ:*** Kefzol†; Zepilen; ***Philipp.:*** Cifoxim; Cizo; Cloviz; Fazol; Fonvicol; Ilozef; Lupex; Maxcep; Megacef; Oryant; Samarial; Stancef; Zofadep; Zolival; ***Pol.:*** Biofazolin; Tarfazolin; ***Port.:*** Cefamezin; Kurgan; ***Rus.:*** Cefamezin (Цефамезин); Ifizol (Ифизол); Intrazoline (Интразолин); Kefzol (Кефзол); Orizolin (Оризолин); Reflin (Рефлин); ***S.Afr.:*** Cefacidal; Izacef; Kefzol; Ranzol; ***Spain:*** Areuzolin; Brizolina; Camil†; Caricef; Cefa Resan†; Cefacene†; Cefadrex; Dacovo†; Fazoplex; Filoklin†; Gencefal†; Intrazolina; Kefol†; Kurgan; Neofazol†; Tasep; Tecfazolina; Zolival; ***Switz.:*** Kefzol; ***Thai.:*** Cefalin; Cefamezin; Cefazillin; Cefazol; Cefzolin; Fazolin; Zefa; Zepilen†; Zolicef; Zolimed; ***Turk.:*** Cefamezin; Cefozin; Equizolin; Iespor; Maksiporin; Sefamax; Sefazol; ***USA:*** Anceff; Zolicef†; ***Venez.:*** Cefacidal; Cefarizon; Cellozina; Kefzol†.

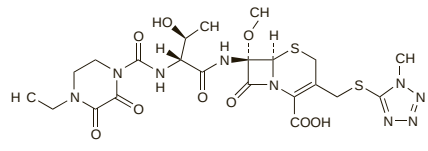
Cefbuperazone *(USAN, rINN)*

BMY-25182; Cefbuperazona; Cefbupérazone; Cefbuperazonum; T-1982. 7-[(2*R*,3*S*)-2-(4-ethyl-2,3-dioxopiperazin-1-ylcarboxamido)-3-hydroxybutyramido]-7-methoxy-3-(1-methyl-1*H*-tetrazol-5-ylthiomethyl)-3-cephem-4-carboxylic acid.

Цефбуперазон

$C_{22}H_{29}N_9O_9S_2$ = 627.7.

CAS — 76610-84-9.



Cefbuperazone Sodium *(rINNM)*

Cefbuperazona de sodio; Cefbupérazone Sodique; Natrii Cefbuperazonum.

Натрий Цефбуперазон

$C_{22}H_{28}N_9NaO_9S_2$ = 649.6.

Pharmacopoeias. In *Jpn*.

Profile

Cefbuperazone is a cephamycin antibiotic similar to cefoxitin (p.230) but with an *N*-methylthiotetrazole side-chain like cefamandole (p.220). It is given by injection as the sodium salt. Its spectrum of activity includes Enterobacteriaceae, but more especially anaerobic bacteria such as *Bacteroides fragilis*. Cefbuperazone does not appear to be active against cefoxitin-resistant strains of *B. fragilis*.

Preparations

Proprietary Preparations (details are given in Part 3)
Jpn: Tomiporan.