

**COMPOSITION:**

**Xorbact Injection 500mg IM/IV:**

Vial: Cefoperazone Sodium equivalent to Cefoperazone ..... 250mg  
Sulbactam Sodium equivalent to Sulbactam ..... 250mg

**Ampoule:** Water for Injection B.P. .... 5 ml

**Xorbact Injection 1g IM/IV:**

Vial: Cefoperazone Sodium equivalent to Cefoperazone ..... 500mg  
Sulbactam Sodium equivalent to Sulbactam ..... 500mg

**Ampoule:** Water for Injection B.P. .... 5 ml

**Xorbact Injection 2g IM/IV:**

Vial: Cefoperazone Sodium equivalent to Cefoperazone ..... 1g  
Sulbactam Sodium equivalent to Sulbactam ..... 1g

**Ampoule:** Water for Injection B.P. .... 10 ml

**DESCRIPTION:**

Sulbactam sodium/cefoperazone sodium combination is available as a dry powder for reconstitution in 1:1 in terms of free SBT/CPZ. Sulbactam sodium is a derivative of the basic penicillin nucleus. It is an irreversible beta-lactamase inhibitor for parenteral use only.

**CLINICAL PHARMACOLOGY:**

**Mechanism of action**

The anti-bacterial component of sulbactam/cefoperazone is cefoperazone, a third generation cephalosporin, which acts against sensitive organisms during the stage of active multiplication by inhibiting biosynthesis of cell wall mucopolysaccharide. Sulbactam does not possess any useful antibacterial activity, except against Neisseriaceae and Acinetobacter. Sulbactam acts as a beta-lactamase inhibitor, thus restoring cefoperazone activity against beta-lactamase producing strains. The combination of sulbactam and cefoperazone is active against all organisms sensitive to cefoperazone.

In addition, it demonstrates synergistic activity in a variety of organisms, most markedly the following:

- Haemophilus influenzae
- Bacteroides species
- Staphylococcus species
- Acinetobacter calcoaceticus
- Enterobacter aerogenes
- Escherichia coli
- Proteus mirabilis
- Klebsiella pneumoniae
- Morganella morganii
- Citrobacter freundii
- Enterobacter cloacae
- Citrobacter diversus

Sulbactam/cefoperazone is active in vitro against a wide variety of clinically significant organisms:

**Gram-Positive Organisms:**

- Staphylococcus aureus, penicillinase and non-penicillinase-producing strains
- Staphylococcus epidermidis
- Streptococcus pneumoniae (formerly Diplococcus pneumoniae)
- Streptococcus pyogenes (Group A beta-hemolytic streptococci)
- Streptococcus agalactiae (Group B beta-hemolytic streptococci)
- Most other strains of beta-hemolytic streptococci
- Many strains of Streptococcus faecalis (enterococcus)

**Gram-Negative Organisms:**

- Escherichia coli
- Klebsiella species
- Enterobacter species
- Citrobacter species
- Haemophilus influenzae
- Proteus mirabilis
- Proteus vulgaris
- Morganella morganii (formerly Proteus morganii)
- Providencia rettgeri (formerly Proteus rettgeri)
- Providencia species
- Serratia species (including S. marcescens)
- Salmonella and Shigella species
- Pseudomonas aeruginosa and some other Pseudomonas species
- Acinetobacter calcoaceticus
- Neisseria gonorrhoeae
- Neisseria meningitidis
- Bordetella pertussis
- Yersinia enterocolitica

**Anaerobic Organisms:**

- Gram-negative bacilli (including Bacteroides fragilis, other Bacteroides species, and Fusobacterium species)
- Gram-positive and gram-negative cocci (including Peptococcus, Peptostreptococcus and Veillonella species)
- Gram-positive bacilli (including Clostridium, Eubacterium and Lactobacillus species)

**PHARMACOKINETICS:**

Cefoperazone is given parenterally as the sodium salt. With intramuscular doses equivalent to cefoperazone 1 or 2 g, peak plasma concentrations of 65 and 97 micrograms/ml have been reported after 1 to 2 hours. The plasma half-life of cefoperazone is about 2 hours, but may be prolonged in neonates and in patients with hepatic or biliary-tract disease. Cefoperazone is 82 to 93% bound to plasma proteins, depending on the concentration. Cefoperazone is widely distributed in body tissues and fluids, although penetration into the CSF is generally poor. It crosses the placenta, and low concentrations have been

detected in breast milk. Cefoperazone is excreted mainly in the bile where it rapidly achieves high concentrations. Urinary excretion is primarily by glomerular filtration. Up to 30% of a dose is excreted unchanged in the urine within 12 to 24 hours; this proportion may be increased in patients with hepatic or biliary disease. Cefoperazone A, a degradation product less active than cefoperazone, has been found only rarely in vivo.

**INDICATIONS:**

**Monotherapy**

Cefoperazone/sulbactam is indicated for the treatment of the following infections when caused by susceptible organisms:

- Respiratory tract infections (Upper and lower)
- Urinary tract infections (Upper and lower)
- Peritonitis, cholecystitis, cholangitis, and other intra-abdominal infections
- Septicemia
- Meningitis
- Skin and soft tissue infections
- Bone and joint infections
- Pelvic inflammatory disease, endometritis, gonorrhoea, and other infections of the genital tract

**Combination Therapy**

Because of the broad-spectrum activity of cefoperazone/sulbactam, most infections can be treated adequately with this antibiotic alone. However, cefoperazone/sulbactam may be used concomitantly with other antibiotics if such combinations are indicated. If an aminoglycoside is used, renal function should be monitored during the course of therapy.

**Dosage and Administration**

Daily dosage recommendations for sulbactam/cefoperazone in adults are as follows:

Ratio	SBT/CPZ (g)	Sulbactam Activity (g)	Cefoperazone Activity (g)
1:1	2.0 – 4.0	1.0 – 2.0	1.0 – 2.0

Doses should be administered every 12 hours in equally divided doses.

In severe or refractory infections, the daily dosage of cefoperazone/sulbactam may be increased up to 8g of the 1:1 ratio (i.e. 4g Cefoperazone activity), patients receiving the 1:1 ratio may require additional cefoperazone administered separately. Doses should be administered every 12 hours in equally divided doses. The recommended maximum daily dosage of sulbactam is 4g.

**Use in Renal Dysfunction**

Dosage regimens of sulbactam/cefoperazone should be adjusted in patients with marked decrease in renal function (creatinine clearance of less than 30 ml/min) to compensate for the reduced clearance of sulbactam. Patients with creatinine clearances between 15 and 30 ml/min should receive a maximum of 1 g of sulbactam administered every 12 hours (maximum daily dosage of 2 g sulbactam), while patients with creatinine clearances of less than 15 ml/min should receive a maximum of 500 mg of sulbactam every 12 hours (maximum daily dosage of 1 g sulbactam). In severe infections, it may be necessary to administer additional cefoperazone. The pharmacokinetic profile of sulbactam is significantly altered by hemodialysis. The serum half-life of cefoperazone is reduced slightly during hemodialysis. Thus, dosing should be scheduled to follow a dialysis period.

**Use in Children**

Daily dosage recommendations for cefoperazone/sulbactam in children are as follows:

Ratio	SBT/CPZ	Sulbactam Activity	Cefoperazone
Activity	mg/kg/day	mg/kg/day	mg/kg/day
1:1	40 – 80	20 – 40	20 – 40

Doses should be administered every 6 to 12 hours in equally divided doses

In serious or refractory infections, these dosages may be increased up to 160mg/kg/day. Doses should be administered in two to four equally divided doses or as directed by the physician.

**Use in Neonates**

For neonates in the first week of life, drug should be given every 12 hours. The maximum daily dosage of sulbactam in pediatrics should not exceed 80mg/kg/day. If more than 80mg/kg/day of cefoperazone activity are necessary, additional cefoperazone should be administered separately or as directed by the physician.

**SIDE EFFECTS**

The most frequent reported adverse effects of sulbactam/cefoperazone are diarrhea, loose stools, nausea, vomiting, hypersensitivity manifested by maculopapular, urticaria, slight decreases in neutrophils, reversible neutropenia, positive direct Coombs test, decreased hemoglobin, hematocrit, eosinophilia, thrombocytopenia, hypo-prothrombinemia, headache, fever, injection pain, chills, transient elevations of liver function tests, SGOT and SGPT, alkaline phosphatase and bilirubin level and phlebitis at the infusion site. The other reported adverse effects are anaphylactoid reaction (including shock), hypotension, pseudomembranous colitis, pruritus, Stevens Johnson Syndrome, hematuria, and vasculitis.

**CONTRAINDICATIONS:**

Cefoperazone/sulbactam is contraindicated in patients with known allergy to penicillin, sulbactam, cefoperazone, or any of the cephalosporins

## WARNINGS AND PRECAUTIONS

- **Hypersensitivity-Serious and occasionally fatal hypersensitivity (anaphylactic) reactions** have been reported in patients receiving beta-lactam or cephalosporin therapy. These reactions are more apt to occur in individuals with a history of hypersensitivity reactions to multiple allergens. If an allergic reaction occurs, the drug should be discontinued and the appropriate therapy instituted. Serious anaphylactic reactions require immediate emergency treatment with epinephrine. Oxygen, intravenous steroids, and airway management, including intubation, should be administered as indicated.
- **Use in Hepatic Dysfunction** - cefoperazone is extensively excreted in bile. The serum half-life of cefoperazone is usually prolonged and urinary excretion of the drug increased in patients with hepatic diseases and/or biliary obstruction. Even with severe hepatic dysfunction, therapeutic concentrations of cefoperazone are obtained in bile and only a 2 to 4 fold increase in half-life is seen. Dose modification may be necessary in cases of severe biliary obstruction, severe hepatic disease or in cases of renal dysfunction coexistent with either of those conditions. In patients with hepatic dysfunction and concomitant renal impairment, cefoperazone serum concentrations should be monitored and dosage adjusted as necessary. In these cases, dosage should not exceed 2 g/day of cefoperazone without close monitoring of serum concentrations.
- **As with other antibiotics, Vitamin K deficiency** has occurred in a few patients treated with cefoperazone. The mechanism is most probably related to the suppression of gut flora which normally synthesize this vitamin. Those at risk include patients with poor diet, malabsorption states (e.g., cystic fibrosis) and patients on prolonged intravenous alimentation regimens. Prothrombin time should be monitored in these patients, and patients receiving anticoagulant therapy, and exogenous vitamin K administered as indicated.
- **As with other antibiotics, overgrowth of nonsusceptible organisms** may occur during prolonged use of sulbactam/cefoperazone. Patients should be observed carefully during treatment.
- **As with any potent systemic agent, it is advisable to check periodically for organ system dysfunction during extended therapy;** this includes renal, hepatic, and hematopoietic systems. This is particularly important in neonates, especially when premature, and other infants.
- **Sulbactam/cefoperazone has been effectively used in infants.** It has not been extensively studied in premature infants or neonates. Therefore, in treating premature infants and neonates potential benefits and possible risks involved should be considered before instituting therapy.
- **Clostridium difficile associated diarrhea (CDAD)** has been reported with use of nearly all antibacterial agents, including sulbactam sodium/cefoperazone sodium, and may range in severity from mild diarrhea to fatal colitis. Treatment with antibacterial agents alters the normal flora of the colon leading to overgrowth of *C. difficile*. *C. difficile* produces toxins A and B which contribute to the development of CDAD. Hypertoxin producing strains of *C. difficile* cause increased morbidity and mortality, as these infections can be refractory to antimicrobial therapy and may require colectomy. CDAD must be considered in all patients who present with diarrhea following antibiotic use. Careful medical history is necessary since CDAD has been reported to occur over two months after the administration of antibacterial agents.

## DRUG INTERACTIONS:

- A reaction characterized by flushing, sweating, headache, and tachycardia has been reported when alcohol was ingested during and as late as the fifth day after cefoperazone administration. A similar reaction has been reported with certain other cephalosporins and patients should be cautioned concerning ingestion of alcoholic beverages in conjunction with administration of sulbactam/cefoperazone. For patients requiring artificial feeding orally or parenterally, solutions containing ethanol should be avoided.

## SPECIAL PRECAUTIONS FOR USE:

### Pregnancy

Cefoperazone should be used during pregnancy only if clearly needed

### Nursing Mothers

Although cefoperazone passes poorly into breast milk of nursing mothers, caution should be exercised when cefoperazone is administered to a nursing woman.

### Geriatric Use

In general, dose selection for an elderly patient should be cautious, usually starting at the low end of the dosing range, reflecting the greater frequency of decreased hepatic, renal or cardiac function, and of concomitant disease or other drug therapy

### Overdose

Limited information is available on the acute toxicity of cefoperazone sodium and sulbactam sodium in humans. Overdosage of the drug would be expected to produce manifestations that are principally extensions of the adverse reactions reported with the drug. The fact that high CSF concentrations of  $\beta$ -lactam antibiotics may cause neurologic effects, including seizures, should be considered. Because cefoperazone and sulbactam are both removed from the circulation by hemodialysis, these procedures may enhance elimination of the drug from the body if overdosage occurs in patients with impaired renal function.

## METHOD FOR PREPARATION:

Xorbact is available in 500mg, 1g and 2g strength vials.

Total Dosage (g)	Equivalent Dosage of Cefoperazone + Sulbactam (g)	Volume of Diluent	Maximum Final Conc. (mg/ml)
0.5	0.25 + 0.25	1.7	125 + 125
1.0	0.5 + 0.5	3.4	125 + 125
2.0	1.0 + 1.0	6.7	125 + 125

Cefoperazone/ Sulbactam has been shown to be compatible with water injection, 5% dextrose, normal saline, 5% dextrose in 0.225% saline and 5% dextrose in normal saline at concentration of 10mg cefoperazone and 5mg sulbactam per ml and up to 250mg cefoperazone and 125mg sulbactam per ml. Reconstituted Solutions are stable for 24 hours at room temperature. All unused solutions must be discarded after that time period.

### Intravenous administration

For intermittent infusion each vial of cefoperazone/sulbactam should be

reconstitute with the appropriate amount of 5% dextrose in water, 0.9% sodium chloride injection or sterile water for injection and then diluted to 20ml with the same solution followed by administration over to 15 to 60 minutes. Lactated Ringer's Solution is a suitable vehicle for intravenous infusion, however not for initial reconstitution (see below for reconstitution in Lactated Ringer's Solution). For intravenous injection, each vial should be reconstituted as above and administered over minimum of 3 minutes.

### Intra muscular administration

Lidocaine HCl 2% is a suitable vehicle for IM administration, however not for initial reconstitution.

### Lactated Ringer's Solution

Initial reconstitution with Lactated Ringer's Solution should be avoided since this mixture has been shown to be incompatible. However, a two step dilution process involving initial reconstitution in Sterile Water for Injection (shown in the table above) will result in a compatible mixture when further diluted with Lactated Ringer's Solution to a sulbactam concentration of 5mg/ml (use 2ml initial dilution in 50ml or 4 ml initial dilution in 100ml Lactated Ringer's Solution).

## INCOMPATIBILITIES:

### Aminoglycosides

Solution of cefoperazone/sulbactam and aminoglycosides should not be directly mixed, since there is a physical incompatibility between them. If combination therapy with sulbactam/cefoperazone and an aminoglycoside is contemplated, this can be accomplished by sequential intermittent intravenous infusion provided that separate secondary intravenous tubing is used, and that the primary intravenous tubing is adequately irrigated with an approved diluent between doses. It is also suggested that doses of cefoperazone/sulbactam be administered throughout the day at times as far removed from administration of the aminoglycoside as possible.

### Lidocaine

Initial reconstitution with 2% lidocaine HCl solution should be avoided since this mixture has been shown to be incompatible. However, a two step dilution process involving initial reconstitution in water for injection will result in a compatible mixture when further diluted with 2% lidocaine HCl solution, as mentioned in the table.

## PRESENTATION:

Xorbact is supplied in the following dosage forms, strengths and pack sizes:

### Xorbact Injection 500mg IM/IV:

1 vial of 250mg cefoperazone + 250mg sulbactam and 1 ampoule of 5ml water for injection.

### Xorbact Injection 1g IM/IV:

1 vial of 500mg cefoperazone + 500mg sulbactam and 1 ampoule of 5ml water for injection.

### Xorbact Injection 2g IM/IV:

1 vial of 1g cefoperazone + 1g sulbactam and 1 ampoule of 10ml water for injection.

## DOSAGE & INSTRUCTIONS:

To be used on the prescription of a registered medical practitioner only.

Keep out of the reach of children.

Do not store above 30°C.

Protect from sunlight, heat and moisture.

Detailed prescribing information is available at [www.curexahealth.com](http://www.curexahealth.com)

زوربیکٹ  
(سینٹیوپیڈازون + سلبیکٹیم)  
آئی ایم / آئی وی انجکشنز  
خوراک و ہدایات:  
مزمن شہزادہ اکوٹ کے ٹوکے مہا ہائی بی، 10، اسلام آباد کی ہے۔  
پکال کی کٹی گئے اور دیکھیں۔ 30°C سے زیادہ دیکھیں نہ ہر مت رکھیں۔  
جوش، گرمی، آبی اور آبی سے گوار کریں۔

Manufactured by:

 **Curexa Health**

Curexa Health Private Limited  
Plot No. 517, Sundar Industrial Estate, Lahore - Pakistan

Ampoule Manufactured by:

**SURGE LABORATORIES**  
10 K.M. Faisalabad Road,  
Bhikhi, District  
Sheikhupura-Pakistan

Marketed by:

 **HIGNOON**

17.5 K.M. Multan Road, Lahore - Pakistan