

Cefuroxime: Indications, MOA, Dosage and Side effects

Cefuroxime is a broad spectrum 2nd generation cephalosporin antibiotic.

It is bactericidal.

It has less susceptibility to penicillinase inactivation than the first-generation cephalosporins.

Class:

2nd Generation Cephalosporin (β -lactam antibiotic)

Spectrum:

Broad-spectrum, bactericidal

Mechanism of Action

Cefuroxime inhibits bacterial cell wall synthesis by binding to **penicillin-binding proteins (PBPs)**. This disrupts the final **transpeptidation step** in peptidoglycan cross-linking, causing bacterial lysis and cell death.

- Resistant to many β -lactamases (penicillinases) compared to first-generation cephalosporins.

Susceptible Organisms

Effective against both Gram-positive and Gram-negative pathogens, including:

- *Borrelia burgdorferi* (Lyme disease)
- *Escherichia coli*
- *Haemophilus influenzae*
- *Klebsiella* spp.
- *Moraxella catarrhalis*
- *Neisseria gonorrhoeae*
- *Proteus mirabilis*
- *Streptococcus pneumoniae*
- *Streptococcus pyogenes*

Pharmacokinetics

- **Absorption:** Oral cefuroxime axetil is a prodrug, hydrolyzed to active cefuroxime after absorption.
- **Distribution:** Widely distributed in extracellular fluid.
- **Metabolism:** Minor metabolism to acetic acid and acetaldehyde.
- **Protein Binding:** ~50%
- **Excretion:** Renally excreted unchanged; ~50% recovered in urine within 12 hours.
- **Half-life:** ~1–1.5 hours

Indications

Cefuroxime is indicated for the treatment of various bacterial infections:

- **Septicemia**
- **Meningitis**
- **Perioperative prophylaxis**
- **Bone and joint infections**
- **Respiratory tract infections**
 - Upper: Otitis media, sinusitis, tonsillitis, pharyngitis
 - Lower: Acute/chronic bronchitis, pneumonia
- **Skin and soft tissue infections** (e.g., impetigo, furunculosis)
- **Urinary tract infections** (e.g., pyelonephritis, cystitis, urethritis)
- **Gonorrhea** (uncomplicated)

Contraindications

- Known hypersensitivity to **cephalosporins** or **penicillins** .

Adverse Reactions

Common (mild):

- GI: Nausea, vomiting, diarrhea
- Local: Pain at IM site

Severe (rare):

- **Hypersensitivity:** Anaphylaxis, angioedema, urticaria, serum sickness
- **GI:** Pseudomembranous colitis
- **Hematologic:** Hemolytic anemia, leukopenia, pancytopenia, thrombocytopenia
- **Hepatic:** Hepatitis, cholestasis, elevated liver enzymes, jaundice
- **Dermatologic:** Erythema multiforme, Stevens-Johnson syndrome (SJS), toxic epidermal necrolysis (TEN)
- **Neurologic:** Headache, seizures (especially in overdose or renal impairment)

Precautions

- Caution in patients with **β-lactam allergy** .
- Risk of **superinfection** with prolonged use (e.g., *C. difficile* colitis).
- Tablets **should not be crushed** ; not recommended for children <5 years.
- Use with caution in **renal impairment** ; although no adjustment is usually necessary, monitoring is advised.
- Consider using **glucose oxidase or hexokinase** for accurate blood glucose monitoring.

Drug Interactions

- **Probenecid:** Increases serum cefuroxime levels (?renal clearance).
- **Antacids/PPIs:** May reduce cefuroxime absorption (?bioavailability).
- **Anticoagulants:** Potentiated effect (?bleeding risk).
- **Cholera vaccine, BCG vaccine:** Reduced effectiveness.
- **Ferricyanide test:** May yield false-negative results.

Use in Pregnancy and Lactation

- **Pregnancy:** No known teratogenic risk. Use only if clearly indicated.
- **Lactation:** Excreted in breast milk. Consider temporary discontinuation of breastfeeding.

Dosage and Administration

Indication	Dose (Adults)
Acute bronchitis	250 mg PO BID
Pneumonia	500 mg PO BID
Uncomplicated UTI	125 mg PO BID
Pyelonephritis	250 mg PO BID
Otitis media	250 mg PO BID
Gonorrhea (uncomplicated)	1000 mg PO single dose

- **Pediatrics (?5 years):** 125 mg PO BID if able to swallow tablets.
- **Duration:** Typically **7 days** .
- **Administration:** Take **after food** to enhance absorption.
- **Special populations:** No dose adjustment usually required for **elderly** or **renal impairment** , but monitor closely.

Overdose Management

- **Symptoms:** Neurotoxicity, including **seizures** and **cerebral irritation** .
- **Treatment:** Supportive care. **Hemodialysis** or **peritoneal dialysis** can help eliminate the drug.