





Introduction

Cefepime is a fourth-generation cephalosporin antibiotic.

It is a broad-spectrum β-lactam that acts against both Gram-positive and Gram-negative bacteria.

Cefepime is resistant to many \(\beta\)-lactamases, which makes it effective against bacteria resistant to earlier

cephalosporins.

It is usually given intravenously (IV) or intramuscularly (IM) to treat severe infections like pneumonia,

urinary tract infections, and sepsis

Mechanism

1) Entry into the Bacterial Cell

- Gram-negative: Enters through outer membrane porin channels; the quaternary ammonium group enhances penetration and prevents efflux.
- **Gram-positive:** No outer membrane, so the drug directly reaches **PBPs** on the cytoplasmic membrane.

2) Binding to PBPs

- PBPs catalyze the final steps of peptidoglycan synthesis:
- Transglycosylation
- Transpeptidation
- Cefepime **covalently binds** to the serine active site of PBPs and **blocks** transpeptidation.

3) Inhibition of Cell Wall Synthesis

• Failure of cross-linking \rightarrow weakened cell wall \rightarrow continued autolysin activity \rightarrow cell lysis (bactericidal).

4) Molecular Features

- **β-lactam ring:** Required for PBP binding.
- Quaternary ammonium group: Enhances Gram-negative penetration.
- **Syn-oxime side chain:** Protects against many β-lactamases.

5) Resistance Mechanisms

- 1. β-lactamase production (ESBL, AmpC, KPC).
- 2. Altered PBPs (e.g., MRSA).
- 3. Reduced/modified porins.
- 4. Efflux pumps.

6) Pharmacodynamics

- Time-dependent killing.
- Efficacy depends on T > MIC (time above MIC).

spectrum activity **%**:

Gram-negative:

- Strong activity.
- Covers Enterobacteriaceae.
- Pseudomonas aeruginosa.

Gram-positive:

- Streptococci
- MSSA
- Not active with MRSA / **Enterococcus**

Anaerobes:

- Poor activity
 - → Requires adding

Metronidazole if anaerobic coverage is needed

Not reliable against:

- ESBL / AmpC producers.
- Stenotrophomonas.
- Acinetobacter (variable).

Cefepime – Dosage Explanation For Adults:

Usual dose:

1 to 2 grams IV every 12 hours. Duration of treatment usually ranges from 7 to 10 days, depending on the infection type and patient response.

Example:

- **UTI** (Urinary Tract Infection) \rightarrow 1 g IV every 12 hours.
- Severe Pneumonia or **sepsis** \rightarrow 2 g IV every 8 hours.

For Children:

Dose is based on body weight:

➤ 50 mg/kg IV every 8 to 12 hours.

Maximum single dose: 2 g.

Example:

If a child weighs 20 kg \rightarrow 20 × 50 = 1000 mg (1 g) IV every 8-12 hours.

PHARMACOKINETICS:

1-ABSORPTION:

- Given IV or IM only
- Not absorbed orally
- After IM injection \rightarrow peak level appears within 1–2 hours

2-DISTRIBUTION:

- Widely distributed in body fluids (lungs, urine, bile, CSF if meninges are inflamed)
- **Protein binding:** 16–19%
- Vd: \geq 0.2 L/kg

3. METABOLISM:

- Minimally metabolized in the body
- A small amount is converted to an inactive metabolite

(N-methylpyrrolidine)

4. EXCRETION:



- Mainly renal (80–90%), excreted unchanged in urine
- **Half-life:** ~2 hours (with normal renal function)
- Dose adjustment is required in renal impairment
- Removed by hemodialysis

Indications

Treats a wide range of bacterial infections

Effective against Gram-positive & Gram-negative bacteria Respiratory tract infections (e.g., pneumonia)

Urinary tract infections (UTIs) Skin & soft tissue infections Intra-abdominal infections



O Contraindications

should not be used in patients who have:

- Allergy to Cefepime
- Hypersensitivity to cephalosporins or β-lactam antibiotics (e.g., penicillin)
- Caution in patients with kidney impairment
- History of severe allergic reactions (anaphylaxis)
- Previous serious β-lactam reactions

Adverse Effects

1) Common

- Diarrhea
- Vomiting
- Redness or swelling at
- injection site

2) Less Common

- Allergic reactions (face or throat swelling)
- Difficulty breathing (especially in penicillin-allergic patients)
- Coma

Interactions

- 1- Loop diuretics
- 2- Aminoglycosides
- 3- Probenecid
- 4- Drugs that lower seizure threshold
- 5- Anticoagulants