

## AN OVERVIEW ON SOME $\beta$ -LACTUM RING CONTAINING THIRD GENERATION CEPHALOSPORINES

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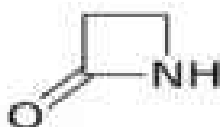
### ABSTRACT

$\beta$ -lactum ring is an important structural unit in many natural and synthetic bio-molecules with remarkable bioactivity. It is one of the important structural unit, which provides a platform for discovery of various novel antibiotics.  $\beta$ -lactum ring system containing drugs are available in medical field as well as molecules in clinical evaluation. In present review we have collected information regarding the uses, absorption, half-life, mechanism of action, adverse effects, drug interaction, trade names etc.

**Keywords:**  $\beta$ -lactum, Cefixime, Cefpodoxime, Cefotaxim, Ceftriaxone.

### INTRODUCTION

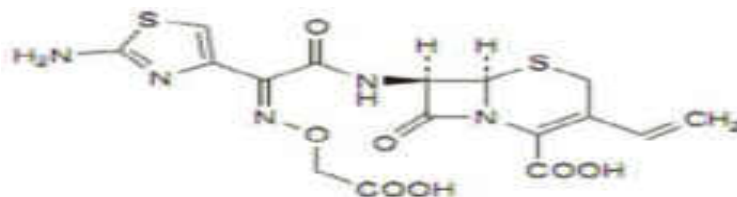
$\beta$ -lactum ring is four membered cyclic amide (lactam) ring. Large number of antibiotics contains this ring.



$\beta$ -lactum ring containing molecules includes penicillins, cephalosporins, cephamycins,  $\beta$ -lactamase inhibitors etc. These are used for large number of bacterial infections. Bacteria may develop tolerance to  $\beta$ -lactum antibiotics to avoid this problem; they may be given in combination with clavulanic acid.

### $\beta$ -lactum ring containing some third generation cephalosporines

#### Cefixime



It is an antibiotic used for various diseases and infections such as pneumonia, urinary tract infections, throat infections, inflammation of the ear, gonorrhoea [1] etc.

**Absorption: Oral:** It is absorbed near about half of the total administration from gastro intestinal tract, while taking it with food the absorption may be decreased [2].

**Half-life:** The half life of cefixime is in between three to four hours.

**Mechanism of action:** It inhibit the cell wall synthesis and destroy the bacteria, it binds with receptors and inhibit the transpeptidation step of the peptidoglycan synthesis in the wall of bacterial cell. It also inhibits the biosynthesis of cell which causes the death of bacterial cell.

**Adverse effects:** Some common adverse effects are nausea and vomiting, diarrhea, skin rashes, indigestion, etc

**Drug interactions:** There is no any major interaction of this drug with alcohol [3]. It may interact with warfarin.

**Trade names:** Abixim 200mg Tablet, Cefiglen 200mg Tablet, Mahacef-200 DT, Milixim 200mg Tab, Ceftas 200mg Tab, Hifen-200 DT, Extacef-200 Tab, Raxim-O-200mg Tab, Topcef 200mg Tab, Seccef 200mg Tab, Asert 200mg Tab, Cefspan 200mg Capsule, Omnicef O 200mg Tablet, Zifi 200 mg Tablet [4], Redicate 200mg Tablet, Omntax-O 200mg Tab, etc.

#### Cefpodoxime



It is effective against various gram positive and negative bacteria, It is used for the treatment of inflammation of middle ear, throat infections, sinusitis, gonorrhea, etc.

**Absorption: Oral:** It is absorbed near about half systemically of the total administration from gastro intestinal tract, while taking with food absorption may increases.

**Half-life:** Approximately three to four hours

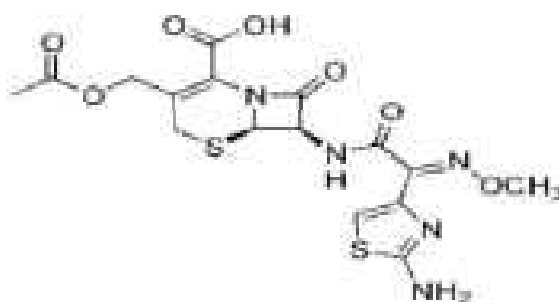
**Mechanism of action:** It inhibits the final transpeptidation step of peptidoglycan synthesis in cell wall which stops the bacterial cell wall synthesis.

**Adserve effects:** Stomach pain, diarrhea, nausea, vomiting, headache etc.

**Drug interactions:** Cefpodoxime may have interaction with probenecid, antiviral drugs.

**Trade names:** Cefdox, Cefobid, Cefodox, Cefodim, Cefomin, Ceforan, Cepdoxim, Cepoxid, Metoxim, Neoprax, Roxetil, Trucef, Vanprox, Victorin, Ximeprox, Ximocef, etc.

### Cefotaxim



It is used against number of bacterial infections[5], joint infections, pelvic inflammatory diseases, meningitis, pneumonia, UTI infections, gonorrhea etc

**Absorption:** Intramuscular good absorption at the site of action

**Half life:** Approx. 60 to 90 min.

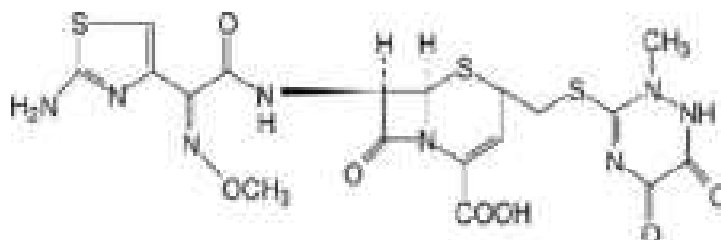
**Mechanism of action:** It binds with one or more PBPs which inhibit final transpeptidationstep of peptidoglycan synthesis in bacterial cell wall and inhibit the biosynthesis of cell wall which causes the inhibition of bacterial cells.

**Adverse effects:**nausea, vomiting, diarrhea, colitis, rashes, fever, pain and inflammation at the site of injection.

**Disease Interactions:**Colitis, renal dysfunction, sodium, dialysis, liver disease etc.

**Trade names:**Cefotim, Claforan, Amtaxime, Augtax, Avicel, Biotax, C-tax, Cefatax, Claforan, Duotax, Efortax,Intax, Novatax, Ominax, Omnatax, Omnicef, Taxim etc.

### Ceftriaxone



It is used for variety of bacterial infections like pneumonia, meningitis, endocarditis, bone infections, ear infections, UTI infections, gonorrhea, pelvic inflammatory diseases [6] pre-surgery to avoid infections [6] etc.

**Absorption:** Intravenously and intramuscular 100% absorption [7, 8].

**Half life:**Approx six to nine hours.

**Mechanism of action:** It binds with transpeptidases (PBPs) which catalyzes the crosslinking of peptidoglycan polymers forming bacterial cell wall [9], it selectively and irreversibly inhibit bacterial cell wall.

**Adverse effects:** Changes in WBCs, rashes, diarrhea, fever, shortness in breath, etc.

**Disease Interactions:** Colitis, gall bladder disease, pancreatitis, renal disease, liver disease etc.

**Trade names:** Ceftizone, Ceftriax, Enocef, Eracef, Topcef, etc.

### **CONCLUSION**

$\beta$ -lactum ring containing third generation cephalosporines are world class of antibiotics, which are widely used for bacterial infections and diseases like pneumonia, urinary tract infections, throat infections, inflammation of the ear, gonorrhoea, inflammation of middle ear, throat infections, sinusitis, joint infections, pelvic inflammatory diseases, meningitis, endocarditis, bone infections, ear infections, pelvic inflammatory diseases, etc.

Large number of R&D units are focusing on  $\beta$ -lactum ring containing antibiotics. In future  $\beta$ -lactum ring containing antibiotics may play a pivotal role in treatment of different diseases.

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