

## Cefotaxime\*

### Class: $\beta$ -lactam

#### Overview

Cefotaxime is a third generation cephalosporin that is administered parenterally. In fact, cefotaxime is one of the most widely used parenteral third generation cephalosporins in medicine. As stated in the general overview of cephalosporins, third generation cephalosporins possess only moderate activity against Gram-positive bacteria, exhibiting reduced activity against staphylococci. However, when compared with second generation cephalosporins, third generation cephalosporins are more active against several Gram-negative bacteria, especially the enterobacteriaceae.

#### Resistance

Although third generation cephalosporins are more effective against Gram-negative  $\beta$ -lactamases than first and second generation cephalosporins, extended spectrum  $\beta$ -lactamases (ESBLs), in recent years, have been effecting increased resistance to third generation cephalosporins like cefotaxime. Often, in-vitro tests indicate susceptibility inaccurately; therefore if ESBLs are detected in an organism, all penicillins, cephalosporins and aztreonam - a monobactam, should be considered resistant.

ESBL resistance is usually carried on large plasmids, frequently imparting resistance to other unrelated antimicrobials. Increased resistance has been noted in *Klebsiella pneumoniae*, *Enterobacter* species and *E coli*. The genes that encode ESBLs are often found on the same plasmids that facilitate resistance to sulfonamides and aminoglycosides, and with enterobacteriaceae, to quinolones, further complicating the problem of multi-drug resistance.

#### Effectiveness

Cefotaxime, like most third generation cephalosporins, is utilized primarily for its activity against Gram-negative aerobic organisms such as *Proteus vulgaris*, *Enterobacter*, *Citrobacter*, *Haemophilus*, *Neisseria* and *Moraxella* species. The drug exhibits only moderate activity against Gram-positive bacteria, although it is often effective against penicillin resistant *Streptococcus pneumoniae* and is inferior in activity against staphylococci. Group B streptococci are uniformly susceptible.

The third generation cephalosporins are usually highly resistant to  $\beta$ -lactamases. Some third generation cephalosporins are effective therapeutic agents against bacterial meningitis caused by susceptible pathogens, due to their ability to cross the blood-brain barrier. Cefotaxime can act synergistically with certain types of fluoroquinolones for effective therapy against meningitis caused by meningococci. Cefotaxime is generally

not effective against *P aeruginosa*. Cefotaxime is used commonly in human medicine in therapy for open fractures, oropharyngeal infections, pharyngitis in resistant to first-line antimicrobials, shigellosis and pneumococcal infections. Cefotaxime in combination with metronidazole can be an effective therapeutic regimen in sepsis and septic shock. Cefotaxime is also ineffective against enterococci and evidence of in-vitro sensitivity should be discounted.

**\*References available by request. Call the Infectious Disease Epidemiology Section, Office of Public Health, Louisiana Department of Health and Hospitals (504-219-4563)**