

## **Doxycycline\***

### **Class: Tetracycline**

#### Overview

Doxycycline, a long acting (12-24 hour dose interval) semi-synthetic tetracycline available as doxycycline hyclate, is now the tetracycline of choice in medicine due to its low cost, reduced toxicity and excellent pharmacokinetic properties. Along with minocycline, the drug is classified as a long acting tetracycline. Doxycycline has excellent in-vitro ability to inhibit staphylococci, including methicillin resistant *Staphylococcus aureus* (MRSA), *S. epidermidis* and Mycobacterium species. In fact, doxycycline and minocycline are superior in liposolubility and better penetrate bacteria (such as *S. aureus*), than do the other drugs of the tetracycline class.

The dose of doxycycline does not have to be adjusted in patients with reduced renal function. The drug is eliminated through the hepatobiliary and gastrointestinal tracts. Doxycycline achieves high concentrations in most tissues and fluids and, unlike most tetracyclines, readily penetrates the blood brain barrier and the CSF.

Impaired gastrointestinal absorption of doxycycline with concurrent ingestion of milk or dairy products is observed to a much lesser extent than with other tetracyclines. Chelation of calcium ions and deposition and inactivation of the chemical in dental enamel and growing bones also occurs at a much lower level with use of doxycycline. However, use of the drug is not recommended in children less than seven to ten years of age.

#### Resistance

(See the discussion of resistance in the general overview of *Tetracyclines*). Although cross-resistance among the tetracyclines is common, doxycycline and minocycline are generally more effective against staphylococci. Despite acquisition of resistance to the tetracyclines in general by anaerobic organisms, doxycycline may remain effective, but susceptibility testing is recommended.

#### Effectiveness

Doxycycline shares a similar spectrum of activity with tetracycline and other tetracycline-related compounds (See the *Effectiveness* section in the *Tetracycline* monograph). Doxycycline is the drug of choice in the treatment of ehrlichiosis and enjoys limited effectiveness against some resistant strains of *S. aureus*. Doxycycline is an option for oral therapy of vancomycin resistant enterococci; community acquired pneumonia caused by penicillin and methicillin resistant *Streptococcus pneumoniae*, *Hemophilus influenzae*, *Moraxella catarrhalis*, or *Legionella* species; community acquired methicillin resistant *S. aureus* (MRSA); *Bacteroides fragilis* and *Vibrio*

*cholerae*. *S. pneumoniae* resistance to doxycycline is, however, increasing. Doxycycline is very effective against the zoonotic pathogens, (such as plague and brucellosis), that have also been implicated as bioterrorist agents. No appreciable resistance to these agents has been observed. Additionally, doxycycline is effective against nongonococcal urethritis caused by *Chlamydia* and *Mycoplasma*. The drug is often used in prophylaxis and treatment of *Plasmodium falciparum* malaria and as prophylaxis for travelers' diarrhea. Doxycycline, unlike the other tetracyclines, can be used in patients with renal insufficiency.

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