Norfloxacin
A Review of Its Antibacterial Activity, Pharmacokinetic Properties and Therapeutic Use

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Summary:

Norfloxacin is one of the new 4-quinolone antibacterial agents. A fluorinated piperazinyl-substituted congener of nalidixic acid, it demonstrates a much wider in vitro antibacterial spectrum and greater potency than the parent compound. Its antibacterial activity against most Gram-negative pathogens is enhanced in comparison to nalidixic acid, but is similar to that of some of the other new 4-quinolones like enoxacin, and slightly less than that of ciprofloxacin. Unlike nalidixic acid, norfloxacin is also active against *Pseudomonas aeruginosa* and some Gram-positive organisms.

In acute or uncomplicated urinary tract infections, norfloxacin has repeatedly been shown to be as effective as co-trimoxazole. Single studies have demonstrated a significantly better bacteriological cure rate with norfloxacin than with pipemidic acid, and similar cure rates with norfloxacin and both a nalidixic acid/sodium citrate mixture and amoxycillin. Similar results were found in a few studies comparing norfloxacin to pipemidic acid or amoxycillin in patients with chronic and/or complicated urinary tract infections. Norfloxacin is as effective as spectinomycin in gonorrhoea due to penicillin-resistant *N. gonorrhoeae*, and cures bacterial gastroenteritis caused by several gastrointestinal pathogens.

Norfloxacin appears to be well tolerated and may have a low propensity to select for bacterial resistance during clinical use, although the latter needs further confirmation.

Antibacterial Activity: Norfloxacin is structurally related to nalidixic acid, but it has a broader in vitro antibacterial spectrum and is generally more active. Most Gram-negative pathogens including *Escherichia coli* and *Klebsiella, Enterobacter, Proteus* and *Citrobacter* species are susceptible to norfloxacin, and are inhibited by concentrations of 2 mg/L or less, with the exception of some strains of *Acinetobacter, Providencia* and *Serratia* species which are slightly less sensitive [minimum inhibitory concentration for 90% of tested strains (MIC<sub>90</sub>): < 1 to 32 mg/L]. 90% of *Pseudomonas aeruginosa* isolates are inhibited by norfloxacin I to 2 mg/L. Although several times more active than nalidixic acid and some other quinolone antibacterial agents such as cinoxacin and oxolinic acid against these pathogens, norfloxacin is usually of similar potency to enoxacin and generally less active than ciprofloxacin. *Haemophilus influenzae* demonstrates marked sensitivity to norfloxacin (MIC<sub>90</sub> < 2 mg/L), as do *Neisseria gonorrhoeae* and *meningitidis*, and a range of organisms which commonly occur as gastrointestinal pathogens, e.g. *Salmonella* and *Shigella* species (MIC<sub>90</sub> < 1 mg/L). Campylobacter species are inhibited by slightly higher concentrations (MIC<sub>90</sub> < 4 mg/L).

*Staphylococci*, including *S. saprophyticus*, are susceptible to norfloxacin (MIC<sub>90</sub> 1 to 4 mg/L) but the streptococci, including enterococci, are more resistant (MIC<sub>90</sub> 2 to 16 mg/L).