Fluoroquinolone Study Cheat Sheet

IDSTEWARDSHIP TRAINING

Mechanisms of Action

1. Targets DNA gyrase (topoisomerase II), causing excess supercoiling that arrests DNA replication
2. Targets topoisomerase IV, interfering with separation of daughter DNA molecules

Killing: Generally considered to have concentration-dependent (*e.g.*, AUC:MIC) bactericidal activity, however pharmacodynamics can vary from organism to organism

NOTE: Fluoroquinolones have different affinity for these targets. For example ciprofloxacin has more DNA gyrase activity, making it more targeted towards Gram negative organisms.

	Ciprofloxacin	Levofloxacin	Moxifloxacin	Delafloxacin
Brand name	Cipro®	Levaquin®	Avelox®	Baxdela®
FDA approval	1994	1996	1999	2017
Available IV	Yes	Yes	Yes	Yes
Available PO	Yes	Yes	Yes	Yes
Oral bioavailability	80%	100%	100%	67%
Typical adult dose	500mg PO BID 400mg IV BID	250-750mg PO or IV daily	400mg PO or IV daily	450mg PO BID or 300mg IV BID
Adjust doses for renal function	Yes	Yes	No	Yes
Streptococcus pneumoniae coverage	+	+++	+++	+++
Pseudomonas aeruginosa coverage	+++	++	+	+++
Anaerobic coverage	-	-	++	++
Atypical coverage	+++	+++	+++	+++

Respiratory FQs

1. Levofloxacin
2. Moxifloxacin
3. Gemifloxacin

Named such for their activity versus the common respiratory pathogen *Streptococcus pneumoniae*

Resistance Genes

GyrA
GyrB
ParC

FDA Boxed Warnings

1. Tendonitis
2. Tendon rupture
3. CNS effects
4. Peripheral neuropathy
5. Worsening of myasthenia gravis

Other Possible Side Effects

- QT interval prolongation
- Photosensitivity
- Hypoglycemia
- Altered mental health
- Diarrhea

- The base molecule for FQs is naladixic acid
- FQ use is linked to MRSA infection and FQ resistance in Gram negatives. Per the FDA, they are not 1st-line drugs for acute bacterial sinusitis, acute bacterial exacerbation of chronic bronchitis, or uncomplicated UTI.
- Generally avoid FQ monotherapy for Enterococci and Staphylococci. Delafloxacin may be an exception, having a role versus MRSA.
- In general avoid moxifloxacin for UTI due to low urine concentrations compared to other FQs
- FQs are widely considered the DOC for prostatitis due to excellent penetration into the prostate
- Beware *E. coli* resistance to fluoroquinolones
- FQs can have a role for treating Mycobacterium tuberculosis and non-tuberculosis mycobacteria
- FQs bind to cations (e.g., calcium, magnesium, aluminum) when given orally at the same time. Separate by taking 2 hours before or 6 hours after cation-containing medications or foods.
- Beware drug-drug interaction with warfarin
- FQs have a variety of ophthalmic and otic preparations

Abbreviations: ABX = antibiotics, DOC = drug of choice, FQ = fluoroquinolone, UTI = urinary tract infection