

**Table 2 Characteristics of some antimicrobial agents used clinically\***

Class and microbial agent (s)	Route of administration	Drug concentration <sup>†</sup> Intracellular/ extracellular ratio	Mechanism of action	Drug interactions	Side effects
Aminoglycoside Amikacin	Parenteral	<1 (105) 2 to 4 after 72 h of incubation (103)	Bactericidal activity results from action on 30S ribosomal subunit to produce faulty protein synthesis	Calcium, sodium bicarbonates, $\exists$ $\beta$ -lactams, and heparin	Nephro- and ototoxicity
$\beta$ -Lactams					
Penicillins Ampicillin	Oral/ Parenteral	<1 in PMNs and macrophages after prolonged incubation (105)	Bactericidal activity results from interference with construction of bacterial cell wall by inhibition of transpeptidases responsible for catalysis of peptidoglycan cross-linking	Allopurinol, bacteriostatic antibiotics (chloramphenicol, sulfonamides, or tetracyclines) may interfere with bactericidal effect of ampicillin and probenecid Aminoglycosides	Nephro-and ototoxicity
Carbapenem Imipenem	Parenteral				
Cephalosporins					
Cefotaxime	Parenteral				
Ceftriaxone	Parenteral				
Cefixime	Oral				
Cefuroxime	Oral/Parenteral				
$\beta$ -Lactam- $\beta$ -lactamase inhibitor Amoxicillin - clavulanic acid	Oral		Bactericidal activity results from the ability of clavulanic acid to inactivate a wide variety of $\beta$ -lactamases by blocking the active sites of these enzymes and thus protects amoxicillin from degradation	Probenecid, allopurinol, antabuse, and ampicillin	Gastrointestinal and hypersensitivity reactions

Macrolides Erythromycin	Oral/Parenteral	16 to 32 in alveolar macrophages (55) 2 to 10 in PMNs (15)	Bactericidal activity results from inhibition of protein synthesis by binding 50S ribosomal subunit	Theophylline, digoxin, oral anticoagulants, ergotamine	Gastrointestinal irritation, transient CNS reactions, and cardiac arrhythmias
Quinolones Ciprofloxacin	Oral/Parenteral	2 to 8 in macrophages and fibroblasts (15)	Bactericidal activity results from gyrase inhibition required to fold DNA strands	Theophylline, magnesium - aluminum antacids, and other cations (calcium, zinc, and iron)	Gastrointestinal, CNS, and skin/allergic reactions
Sulfonamides					
Sulfamethoxazole	Oral	1.7 in PMNs (34) 4.1 in PMNs (34) and 9 at 37°C and 13 at 25°C (50)	Bacteriostatic results from the inhibition of folate pathway	Thiazides, warfarin, phenytoin, cyclosporine, and cyclosporin	Hepatotoxicity, myelosuppression, and gastrointestinal, allergic skin, hematologic, neurologic, and psychiatric reactions
Trimethoprim	Oral				
TMP-SMX	Oral/Parenteral				
Tetracyclines					
Doxycycline	Oral/Parenteral	7.1 in PMNs (34)	Bacteriostatic activity results from inhibition of protein synthesis	Antacids and anticoagulant therapy Bacteriostatic drugs may interfere with bactericidal action of penicillin	Gastrointestinal reactions and renal toxicity Hypersensitivity reactions and IV minocycline may cause thrombophlebitis
Minocycline	Oral/Parenteral				

\*Adapted from Physicians' Desk Reference (84) except where referenced.

†PMN, polymorphonuclear leukocytes; CNS, central nervous system; and IV, intravenous.