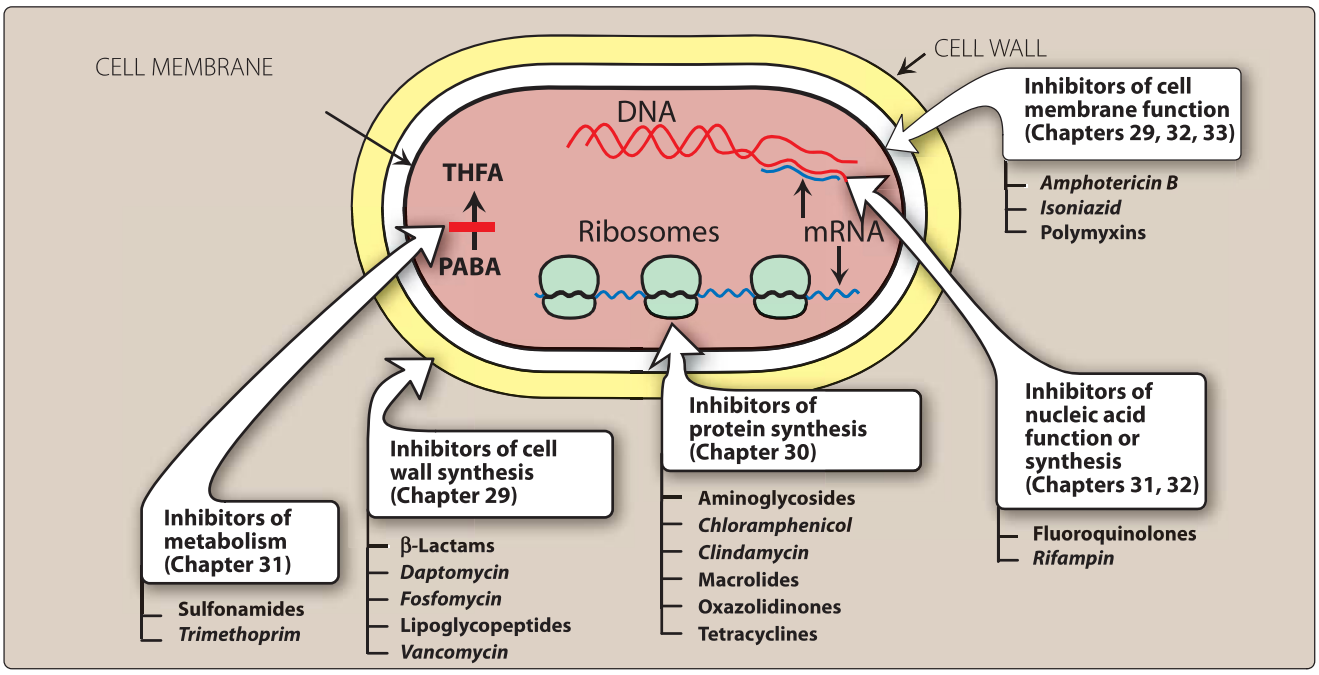

Figure 28.9
Classification of some antimicrobial agents by their sites of action. THFA = tetrahydrofolic acid; PABA = *p*-aminobenzoic acid.

Study Questions

Choose the ONE best answer.

28.1 A 24-year-old pregnant woman presents to the urgent care clinic with fever and urinary frequency and urgency. She is diagnosed with a urinary tract infection (UTI). Based on potential harm to the fetus, which of the following medications should be avoided in treating her UTI?

A. Nitrofurantoin
B. Amoxicillin
C. Cephalexin
D. Doxycycline

Correct answer = D. Doxycycline (a tetracycline) should be avoided due to the potential harm to the fetus. Nitrofurantoin, amoxicillin (a penicillin), and cephalexin (a cephalosporin) are generally considered safe.

28.2 Which of the following is the primary method of β-lactam resistance with Streptococcus pneumoniae?

A. Modification of target site
B. Decreased drug levels due to changes in permeability
C. Decreased drug levels due to an efflux pump
D. Enzymatic inactivation

Correct answer = A. S. pneumoniae resistance to β-lactam antibiotics involves alteration in one or more of the major penicillin-binding proteins.

28.3 Which of the following agents is considered a narrow-spectrum antibiotic?

A. Ceftriaxone
B. Ciprofloxacin
C. Isoniazid
D. Imipenem

Correct answer = C. Isoniazid is only active against Mycobacterium tuberculosis, while ceftriaxone, ciprofloxacin, and imipenem are considered broad spectrum due to their activity against multiple types of bacteria and increased risk for contributing to the development of a superinfection.

28.4 Which of the following antibiotics exhibits concentration-dependent killing?

A. Clindamycin
B. Linezolid
C. Vancomycin
D. Daptomycin

Correct answer = D. Clindamycin, linezolid, and vancomycin exhibit time-dependent killing, while daptomycin works best when administered in a fashion that optimizes concentration-dependent killing.

28.5 Which of the following antibiotics exhibits a long postantibiotic effect that permits once-daily dosing?

A. Gentamicin
B. Penicillin G
C. Vancomycin
D. Aztreonam

Correct answer = A. Aminoglycosides, including gentamicin, possess a long postantibiotic effect, especially when given as a high dose every 24 hours. Penicillin G, clindamycin, and vancomycin have a relatively short postantibiotic effect and require dosing that maintains concentrations above the MIC for a longer portion of the dosing interval.

28.6 A 58-year-old man with a history of hepatitis C, cirrhosis, and ascites presents with spontaneous bacterial peritonitis. Which of the following antibiotics requires close monitoring and dosing adjustment in this patient given his liver disease?

A. Penicillin G.
B. Tobramycin.
C. Erythromycin.
D. Vancomycin.

Correct answer = C. Erythromycin is metabolized by the liver and should be used with caution in patients with hepatic impairment. Penicillin G, tobramycin, and vancomycin are primarily eliminated by the kidneys.

28.7 JS is a 3-day-old neonate, born at 37 weeks' gestation, who presents with new onset fever, lethargy, and decreased desire to feed. Based on JS's age, which of the following antibiotics is considered safe to use in neonates?

A. Chloramphenicol
B. Sulfamethoxazole/trimethoprim
C. Tetracycline
D. Ampicillin

Correct answer = D. Chloramphenicol and sulfonamides (sulfamethoxazole) can cause toxic effects in newborns due to poorly developed renal and hepatic elimination processes. Tetracycline can have effects on bone growth and development and should be avoided in newborns and young children. Ampicillin is safe and effective in this population.

28.8 When evaluating drug therapy for meningitis, which of the following factors is expected to have the LEAST influence on the penetration and concentration of an antibacterial agent in the cerebrospinal fluid?

A. Lipid solubility of the drug
B. Minimum inhibitory concentration of the drug
C. Protein binding of the drug
D. Molecular weight of the drug

Correct answer = B. Although the minimum inhibitory concentration impacts the effectiveness of the drug against a given bacteria, it does not affect the ability of a drug to penetrate into the brain. Lipid solubility, protein binding, and molecular weight all determine the likelihood of a drug to penetrate the blood–brain barrier and concentrate in the brain.

28.9 A 72-year-old male presents with fever, cough, malaise, and shortness of breath. His chest x-ray shows bilateral infiltrates consistent with pneumonia. Bronchial wash cultures reveal Pseudomonas aeruginosa sensitive to cefepime. Which of the following is the best dosing scheme for cefepime based on the drug's time-dependent bactericidal activity?

A. 1 g every 6 hours given over 30 minutes
B. 2 g every 12 hours given over 3 hours
C. 4 g every 24 hours given over 30 minutes
D. 4 g given as continuous infusion over 24 hours

Correct answer = D. The clinical efficacy of cefepime is based on the percentage of time that the drug concentration remains above the MIC. A continuous infusion would allow for the greatest amount of time above the MIC compared to intermittent (30 minutes) and prolonged infusions (3 to 4 hours).

28.10 Which of the following adverse drug reactions precludes a patient from being rechallenged with that drug in the future?

A. Itching/rash from penicillin
B. Stevens-Johnson syndrome from sulfamethoxazole–trimethoprim
C. Gastrointestinal (GI) upset from clarithromycin
D. *Clostridium difficile* superinfection from moxifloxacin

Correct answer = B. Stevens-Johnson syndrome is a severe idiosyncratic reaction that can be life threatening, and these patients should never be rechallenged with the offending agent. Itching/rash is a commonly reported reaction in patients receiving penicillins but is not life threatening. A patient may be rechallenged if the benefits outweigh the risk (for example, pregnant patient with syphilis) or the patient could be exposed through a desensitization procedure. GI upset is a common side effect of clarithromycin but is not due to an allergic reaction. Moxifloxacin is a broad-spectrum antibiotic that can inhibit the normal flora of the GI tract, increasing the risk for the development of superinfections like *C. difficile*. This is not an allergic reaction, and the patient can be rechallenged; however, the patient might be at risk for developing *C. difficile* infection again.