

throughout the body. Although the metabolic pathway of *linezolid* has not been fully determined, it is known that it is metabolized via oxidation to two inactive metabolites. The drug is excreted both by renal and nonrenal routes. *Tedizolid* is metabolized by sulfation, and the majority of elimination occurs via the liver, and drug is mainly excreted in the feces. No dose adjustments are required for either agent for renal or hepatic dysfunction.

E. Adverse effects

The most common adverse effects are gastrointestinal upset, nausea, diarrhea, headache, and rash. Thrombocytopenia has been reported, usually in patients taking the drug for longer than 10 days. *Linezolid* and *tedizolid* possess nonselective monoamine oxidase activity and may lead to serotonin syndrome if given concomitantly with large quantities of tyramine-containing foods, selective serotonin reuptake inhibitors, or monoamine oxidase inhibitors. The condition is reversible when the drug is discontinued. Irreversible peripheral neuropathies and optic neuritis causing blindness have been associated with greater than 28 days of use, limiting utility for extended-duration treatments.

Study Questions

Choose the **ONE** best answer.

- 30.1 Which of the following adverse effects is often employed as a therapeutic use for erythromycin?
- QTc prolongation
 - Increased gastrointestinal motility
 - Photosensitivity
 - Deposition in bone
- 30.2 Which of the following describes the mechanism of action of tetracycline antibiotics?
- Bind the 30S subunit of the bacterial ribosome, preventing binding of tRNA to the mRNA–ribosome complex.
 - Bind the 30S ribosomal subunit, interfering with assembly of the functional ribosomal apparatus.
 - Bind irreversibly to a site on the 50S subunit of the bacterial ribosome, inhibiting translocation steps of protein synthesis.
 - Bind the bacterial 23S ribosomal RNA of the 50S subunit, inhibiting the formation of the 70S initiation complex.
- 30.3 Linezolid would be a good choice for antibiotic treatment in which of the following patient scenarios?
- Bacteremia caused by *Staphylococcus aureus*
 - Urinary tract infection caused by *Escherichia coli*
 - Pneumonia caused by drug-resistant *Streptococcus pneumoniae*
 - Diabetic foot infection caused by *Pseudomonas aeruginosa*

Correct answer = B. Macrolides, but especially erythromycin, cause GI distress and increase motility of the GI tract, which is often used to treat gastroparesis and/or postoperative ileus. QTc prolongation is an adverse effect of erythromycin but not one employed therapeutically. Photosensitivity and deposition in bone are adverse effects of tetracyclines.

Correct answer = A. Tetracyclines enter susceptible organisms via passive diffusion and also by an energy-dependent transport protein mechanism unique to the bacterial inner cytoplasmic membrane. The drugs bind reversibly to the 30S subunit of the bacterial ribosome. This action prevents binding of tRNA to the mRNA–ribosome complex, thereby inhibiting bacterial protein synthesis. B is the mechanism for aminoglycosides, C is the mechanism for macrolides, and D is the mechanism for oxazolidinones.

Correct answer = C. Linezolid does have coverage against resistant *S. pneumoniae*. It is not an optimal choice for treatment of bacteremia. Linezolid also does not have gram-negative coverage against *E. coli* and *P. aeruginosa*.

30.4 After 5 days of clindamycin treatment for a skin infection, a patient develops diarrhea (10 watery stools/day), severe abdominal pain, and fever. Which of the following organisms would you be concerned about as the causative pathogen of diarrhea?

- A. Escherichia coli
- B. Bacteroides fragilis
- C. Staphylococcus aureus
- D. Clostridium difficile

Correct answer = D. Clindamycin use has been associated with Clostridium difficile-associated diarrhea. This infection should be considered in a patient who presents with diarrhea while on clindamycin.

30.5 Which of the following statements accurately describes the difference in spectrum of activity between erythromycin and azithromycin?

- A. Azithromycin has better activity against respiratory pathogens such as Haemophilus influenzae and Moraxella catarrhalis but less potent activity against staphylococci and streptococci.
- B. Erythromycin has the same activity as azithromycin against gram-positives and gram-negatives.
- C. Azithromycin has better activity against staphylococci and streptococci compared to erythromycin.
- D. Erythromycin has better activity against gram-negatives such as H. influenzae.

Correct answer = A. Erythromycin has better activity against gram-positive organisms, so B and C are incorrect. D is incorrect as azithromycin has better activity against H. influenzae.

30.6 Which of the following antibiotic agents should not be given to children less than 8 years of age due to its deposition in bone and teeth?

- A. Azithromycin
- B. Doxycycline
- C. Linezolid
- D. Quinupristin/dalfopristin

Correct answer = B. Tetracyclines are contraindicated in this age group because they are deposited in tissues undergoing calcification, such as teeth and bone, and can stunt growth.

30.7 A 77-year-old woman was started on antibiotics for pneumonia treatment. After 3 days of antibiotic therapy, the serum creatinine doubled. Which of the following antibiotics is most likely responsible for this increase in serum creatinine?

- A. Doxycycline
- B. Clarithromycin
- C. Tobramycin
- D. Linezolid

Correct answer = C. Aminoglycosides such as tobramycin accumulate in the proximal tubular cells of the kidney and disrupt calcium-mediated transport processes. This results in kidney damage ranging from mild, reversible renal impairment to severe, potentially irreversible acute tubular necrosis. Nephrotoxicity is not commonly associated with tetracyclines, macrolides or oxazolidinones.

30.8 A 24-year-old pregnant woman was diagnosed with community-acquired pneumonia and will be managed in the outpatient setting. Which antibiotic is a safe option for this patient to treat her pneumonia?

- A. Azithromycin
- B. Doxycycline
- C. Fidaxomicin
- D. Gentamicin

Correct answer = A. Azithromycin is available orally and considered safe in pregnancy. Doxycycline should not be used in pregnancy due to its ability to cross the placenta and affect bone and skeletal development in the fetus. Fidaxomicin does not reach therapeutic concentrations in serum or at this site of infection. It concentrates in the gut. Gentamicin crosses the placental barrier and may accumulate in fetal plasma and amniotic fluid. It would also not be used clinically in this outpatient scenario.

30.9 Parents of a 1-month-old baby are told their child has developed "gray baby syndrome." Which of the following antibiotics did the baby likely receive?

- A. Tobramycin
- B. Linezolid
- C. Erythromycin
- D. Chloramphenicol

Correct answer = D. Gray baby syndrome is an adverse effect caused by chloramphenicol in neonates due to their underdeveloped renal function and low capacity to glucuronidate the antibiotic. The other agents do not undergo this glucuronidation.

- 30.10 Aminoglycosides are commonly used for their concentration-dependent bactericidal activity against which group of organisms?
- A. Gram-positive aerobes
 - B. Gram-negative aerobes
 - C. Gram-positive anaerobes
 - D. Gram-negative anaerobes

Correct answer = B. Although aminoglycosides (such as gentamicin) are sometimes used synergistically against gram-positive aerobes, this is not their most common use. They are typically used for their activity against gram-negative aerobes. Aminoglycosides do not have good anaerobic activity.