Chapter 8 Antibacterial Drugs That Interfere With Protein Synthesis

Tetracyclines

- Anti-infectives composed of natural and semisynthetic compounds
- **Actions:** inhibit bacterial protein synthesis
- **Used as broad-spectrum antibiotic** when penicillin is contraindicated
- **Treat the following infections**: Rickettsial diseases; intestinal amebiasis; skin and soft tissue infections; uncomplicated urethral, endocervical, or rectal infections; adjunctive treatment; and infection with Helicobacter pylori

Tetracyclines: Adverse Reactions

- Gastrointestinal/other body system reactions:
  - Nausea and/or vomiting
  - Diarrhea
  - Epigastric distress
  - Stomatitis
  - Sore throat
  - Skin rashes
  - Photosensitivity reaction

Tetracyclines: Contraindications

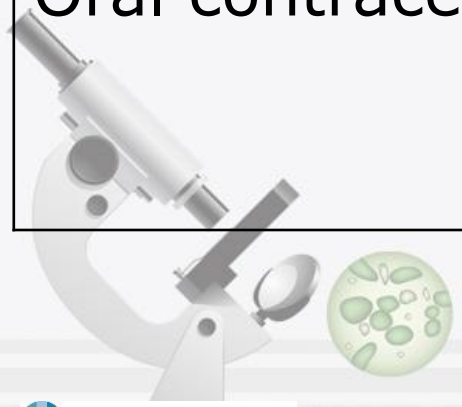
- Contraindicated in patients:
  - With hypersensitivity; during pregnancy, lactation; children younger than 9 years
- Nursing alert:
  - Not given to children younger than 9 years of age
  - Prolonged therapy: Bacterial/fungal overgrowth of nonsusceptible organisms

Tetracyclines: Precautions

- Used cautiously in patients with:
  - Impaired renal function
  - Liver impairment
- Chronic care alert:
  - May reduce insulin requirements in patients with diabetes. Blood glucose levels should be monitored frequently.

Tetracyclines: Interactions #1

Interacting drug	Effect of interaction
Antacids containing aluminum, zinc, magnesium, or bismuth salts	Decreases effectiveness of tetracyclines
Oral anticoagulants	Increases risk for bleeding
Oral contraceptives	Decreases effectiveness of contraceptive agent



Tetracyclines: Interactions #2

Interacting drug	Effect of interaction
Digoxin	Increases the risk for digitalis toxicity
Calcium-rich foods	Causes potentially impaired absorption of tetracycline

Aminoglycosides: Actions and Uses

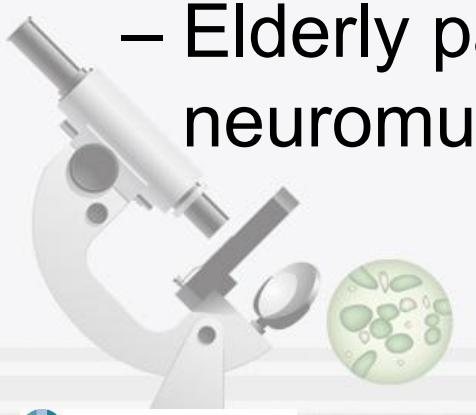
- Blocks step in protein synthesis necessary for bacterial multiplication
- Used against gram-negative microorganisms
- Bowel preparation
- Hepatic coma

Aminoglycosides: Adverse Reactions

- Nausea
- Vomiting
- Anorexia
- Rash
- Urticaria
- Nephrotoxicity (damage to the kidneys by a toxic substance)
- Ototoxicity (damage to the hearing organs by a toxic substance)
- Neurotoxicity (damage to the nervous system by a toxic substance)

Aminoglycosides: Contraindications and Precautions

- Contraindicated in patients:
  - With hypersensitivity to aminoglycosides, pre-existing hearing loss, myasthenia gravis, parkinsonism; during lactation and pregnancy (category C and D). Long-term therapy risk: ototoxicity and nephrotoxicity.
- Used cautiously in:
  - Elderly patients; patients with renal failure and neuromuscular disorders



Aminoglycosides: Interactions

- Cephalosporins
- Loop diuretics
- Pavulon or Anectine

Macrolides

- Effective against a wide variety of pathogenic organisms, particularly infections of the respiratory and genitourinary tracts
- Actions:
  - Act by causing changes in protein function and synthesis

Macrolides: Uses

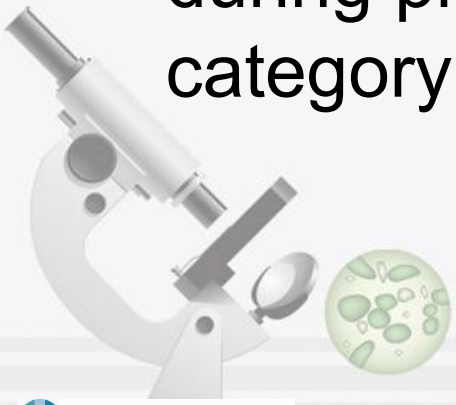
- Used as prophylaxis before dental or other procedures in patients allergic to penicillin and in the treatment of:
  - A wide range of gram-negative and gram-positive infections
  - Acne vulgaris and skin infections
  - Upper respiratory infections caused by *Haemophilus influenza*

Adverse Reactions of Macrolides

- Gastrointestinal (GI) and other reactions:
  - Nausea
  - Vomiting
  - Diarrhea
  - Abdominal pain or cramping
  - Pseudomembranous colitis
  - Visual disturbances

Macrolides: Contraindications and Precautions

- Contraindicated in patients:
  - With a hypersensitivity to the macrolides; with pre-existing liver disease; prescribed cisapride (Propulsid) or pimozide (Orap)
- Used cautiously in patients:
  - With liver dysfunction; with myasthenia gravis; during pregnancy or lactation (pregnancy category B and C)



Macrolides: Interactions #1

Interacting Drug	Effect of Interaction
Antacids (kaolin, aluminum salts, or magaldrate)	Decreases absorption and effectiveness of macrolide
Digoxin	Increases serum levels of digoxin
Anticoagulants	Increases risk of bleeding

Macrolides: Interactions #2

Interacting Drug	Effect of Interaction
Clindamycin, lincomycin, or chloramphenicol	Decreases therapeutic activity of the macrolide
Theophylline	Increases serum theophylline level

Lincosamides

- Used for treating serious infections in which penicillin or erythromycin is not effective
- Used for the more serious infections
- Used in conjunction with other antibiotics
- Actions: Inhibits protein synthesis in susceptible bacteria, causing cell death
- Effective in the treatment of infections caused by a wide range of gram-negative and gram-positive microorganisms

Lincosamides: Adverse Reactions

- Gastrointestinal/other body reactions:
  - Abdominal pain
  - Esophagitis
  - Nausea
  - Vomiting
  - Diarrhea
  - Skin rash
  - Blood dyscrasias

Lincosamides: Contraindications and Precautions

- Contraindicated in patients:
  - With hypersensitivity to the lincosamides; prescribed cisapride (Propulsid) or the antipsychotic drug pimozide (Orap); having minor bacterial or viral infections
- Used cautiously in patients with:
  - History of GI disorders; renal disease; liver impairment; myasthenia gravis

Lincosamides: Interactions

Interacting Drug	Effect of Interaction
Kaolin or aluminum-based antacids	Decreases absorption of the lincosamide
Neuromuscular blocking drugs	Increases action of neuromuscular blocking drug, possibly leading to severe and profound respiratory depression

Nursing Process: Assessment #1

- Preadministration assessment:
  - Establish an accurate database before the administration of any antibiotic
  - Obtain general health history
  - Record vital signs and obtain description of signs and symptoms
  - Note patient's general appearance
  - Obtain culture and sensitivity test results

Nursing Process: Assessment #2

- Ongoing assessment:
  - Take vital signs every 4 hours or as ordered
  - Notify the primary health care provider if there are changes in the vital signs or if signs and symptoms worsen
  - Compare current signs and symptoms of infection and record any specific findings

Nursing Process: Nursing Diagnoses #1

- **Impaired Comfort:** increased Fever related to ineffectiveness of anti-infective therapy
- **Acute Confusion** related to increased ammonia blood levels
- **Ineffective Tissue Perfusion**: renal related to adverse drug reactions to aminoglycosides

Nursing Process: Nursing Diagnoses #2

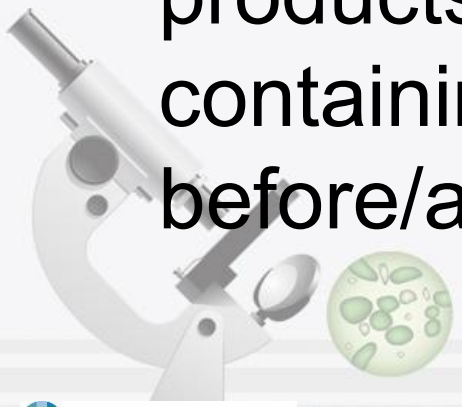
- **Risk for Injury** related to visual disturbances from telithromycin treatment, paresthesia secondary to neurotoxicity, or auditory damage from aminoglycosides
- **Diarrhea** related to superinfection secondary to anti-infective therapy, adverse drug reaction

Nursing Process: Planning

- The expected outcome includes an optimal response to therapy:
  - Controlling the infectious process or prophylaxis of bacterial infection
  - Management of adverse drug effects
  - Understanding of and compliance with the prescribed treatment regimen

Nursing Process: Implementation #1

- Promoting an optimal response to therapy:
  - Oral administration: tetracyclines
    - On an empty stomach and with a full glass of water (exceptions: minocin and terramycin)
  - Nursing alert: do not give with dairy products, antacids, laxatives, or products containing iron; if prescribed, give 2 hours before/after administration of tetracycline



Nursing Process: Implementation #2

- Promoting an optimal response to therapy (cont.)
  - Oral administration: aminoglycosides: enteric-coated erythromycin given with neomycin
  - Drug delivery timing is critical for optimal response of suppression of intestinal bacteria when preparing a patient for surgery with kanamycin or neomycin

Nursing Process: Implementation #3

- Promoting an optimal response to therapy (cont.)
  - Oral administration: macrolides
    - Administered without regard to meals and with milk
    - Exceptions: azithromycin, dirithromycin, erythromycin

Nursing Process: Implementation #4

- Promoting an optimal response to therapy (cont.)
  - Oral administration: lincosamides
    - Food impairs absorption
    - Patient should not take anything by mouth for 1 to 2 hours before and after
    - Give clindamycin with food or a full glass of water

Nursing Process: Implementation #5

- Promoting an optimal response to therapy (cont.)
  - Parenteral administration:
    - Intramuscularly: inspect previous injection sites for signs of pain or tenderness, redness, and swelling
      - Antibiotics: temporary local reactions
      - Rotate injection sites; record site

Nursing Process: Implementation #6

- Promoting an optimal response to therapy (cont.)
  - Parenteral administration (cont.)
    - Intravenously: inspect needle site and area around needle for signs of extravasation of the IV fluid or tenderness, pain, and redness

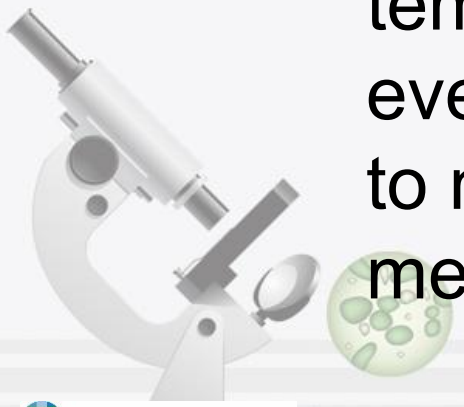
      - In case of symptoms: restart the IV in another vein; report to primary health care provider

Nursing Process: Implementation #7

- Monitoring and managing patient needs:
  - Observe patient: frequent intervals, especially first 48 hours of therapy
  - Report: any adverse reaction before next dose
  - Serious adverse reactions: severe hypersensitivity reaction, respiratory difficulty, severe diarrhea, severe drop in blood pressure

Nursing Process: Implementation #8

- Monitoring and managing patient needs (cont.):
  - Impaired comfort: increased fever
    - Monitor: temperature at frequent intervals
    - Elevated temperature: check temperature, pulse, and respirations every hour until temperature returns to normal; administer antipyretic medication if prescribed



Nursing Process: Implementation #9

- Monitoring and managing patient needs (cont.)
  - Risk for injury:
    - Telithromycin: causes difficulty in focusing and accommodating light
    - Caution patients: potential for accidents or injury when driving, operating machinery, or engaging in other hazardous activities

Nursing Process: Implementation #10

- Monitoring and managing patient needs (cont.)
  - Diarrhea: superinfection
    - Inspect stools: for blood or mucus
    - Encourage: drinking fluids
    - Maintain: accurate intake, output record
    - Observe: signs or symptoms of bacterial or fungal superinfection

Nursing Process: Implementation #11

- Educating the patient and family:
  - Advise to take drug at prescribed time intervals and to not increase or omit dosage unless advised
  - Explain the importance of completing the entire course of treatment
  - Advise taking dose with full glass of water
  - Explain necessity of notifying primary health care provider if symptoms worsen

Nursing Process: Implementation #12

- Educating the patient and family (cont.):
  - Advise to avoid alcoholic beverages during therapy
  - If tetracycline is prescribed: advise to avoid exposure to the sun or tanning lamps or beds; completely cover arms and legs and wear wide-brimmed hat to protect face and neck; sunscreen: may or may not be effective; consult primary health care provider

Nursing Process: Evaluation

- The therapeutic effect is achieved; infection is controlled; normal vision unaffected; no diarrhea
- Adverse reactions: identified, reported, and managed
- Patient and family demonstrate understanding of drug regimen
- Patient verbalizes the importance of complying with prescribed therapeutic regimen

Question #1

- Is the following statement true or false?
- Tetracyclines are primarily bacteriostatic and are often used when the patient is allergic to penicillin or cephalosporin.

Answer to Question #1

- True

Question #2

- Is the following statement true or false?

- Aminoglycosides, macrolides, and lincosamides are primarily bactericidal; they work by preventing the bacterial cell from making protein (synthesis), causing cell death.

Answer to Question #2

- True
- Aminoglycosides, macrolides, and lincosamides are primarily bactericidal; they work by preventing the bacterial cell from making protein (synthesis), causing cell death.

Question #3

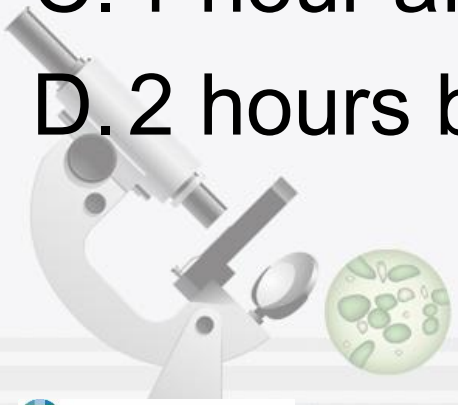
- Dairy and calcium products inhibit the absorption of the tetracyclines. What is the best time to take the medication to enhance the absorption of the tetracyclines?

A. 1 hour before meals

B. With meals

C. 1 hour after meals

D. 2 hours before meals



Answer to Question #3

- A
- Dairy and calcium products inhibit the absorption of the tetracyclines. Therefore, take these drugs at least 1 hour before or 2 hours after a meal.