Chemotherapy and Antibiotics

Nester Pages 500 - 511; 516 - 518

1. Introduction

   A. Origin of Antibiotics (Page 501)

   B. Selective Toxicity (Page 502)

   C. Action Classifications (Page 503

      i. Bacteriostatic

      ii. Bactericidal

2. Chemotherapy

   A. Spectrum of Microbial Activity (Page 503)

      i. Narrow-spectrum Antibiotics

         • Penicillin G

      ii. Broad-spectrum Antibiotics

         • Superinfection

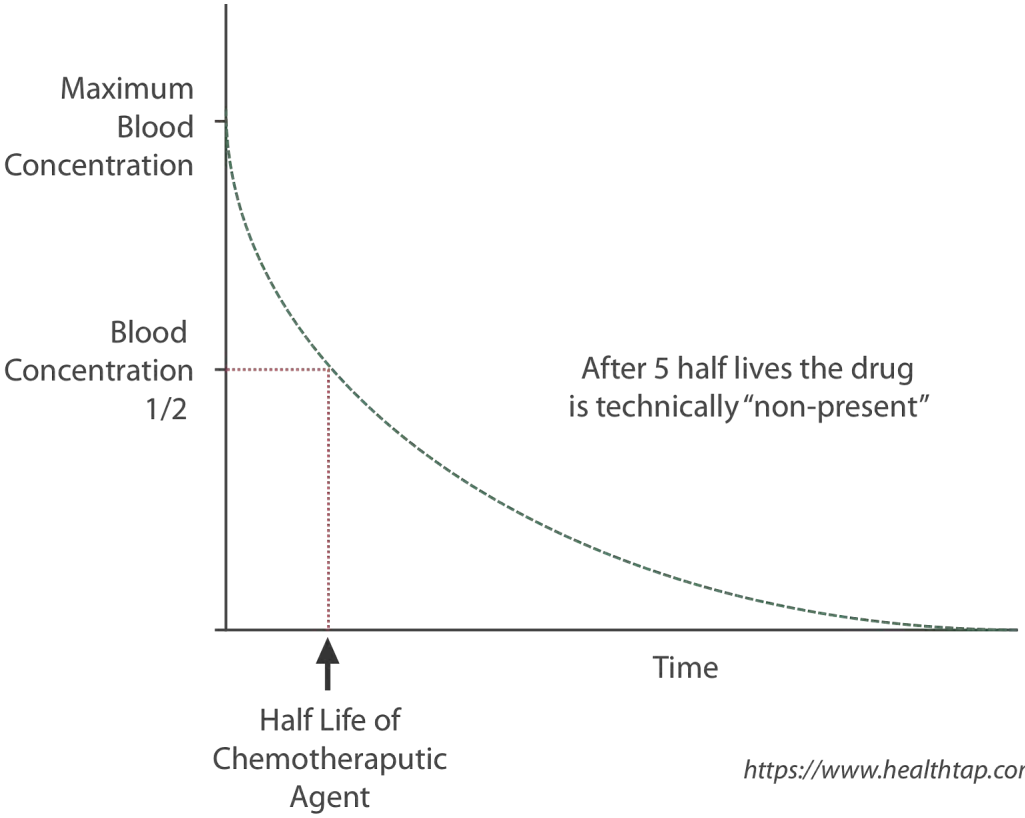
            * Elimination of competition: *Candida albicans*

            * *also*, Resistance to Drugs

      vi. Indication

      vii. Contraindication

viii. Half Life (Page 503)



https://www.healthtap.com/user_questions/941717

B. Characteristics of a good chemothereputic agent (Pages 503 - 504)

i. Selective Toxicity

ii. non-allergenic

iii. disease should not become readily resistant to the drug

iv. host should not destroy, neutralize, or excrete the drug

v. the drug must be able to reach the infection site.

3. Overview of Chemotheraputic Modes of Action (Pages 504 - 505)

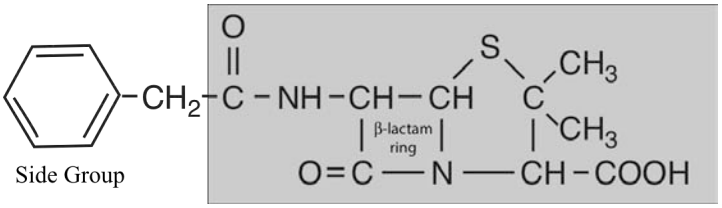
(Pull out downloadable handout)

4. Inhibition of Cell Wall Synthesis (Pages 504 - 506)

A. Penicillin

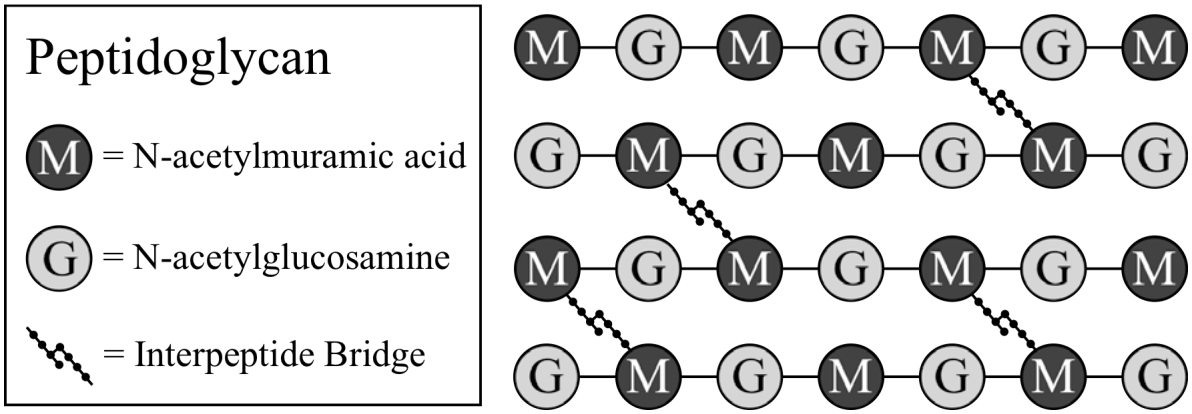
- Antibiotics

i. Structure



ii. Mechanism

- Peptidoglycan Structural Considerations



* N-acetylgucosamine

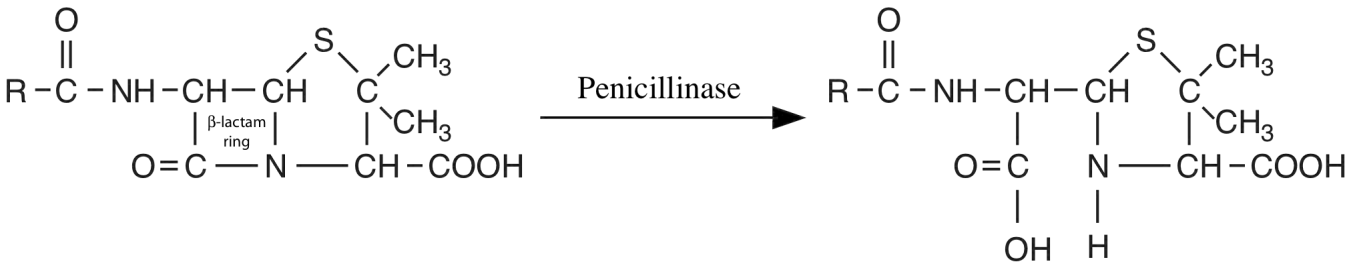
* N-acetylmuramic acid

- Transpeptidase (Penicillin-Binding Protein)

iii. Draw Backs

a. Anaphylactic Reaction

b. Penicillinase (β lactamase) (Page 505)



c. Resistance

- Methicillin
  - MRSA (Methicillin -resistant *Staphylococcus aureu*
  - β-Lactamase Inhibitors (Pull out handout)

iv. Natural Penicillins

v. Semisynthetic or Extended Spectrum Penicillins

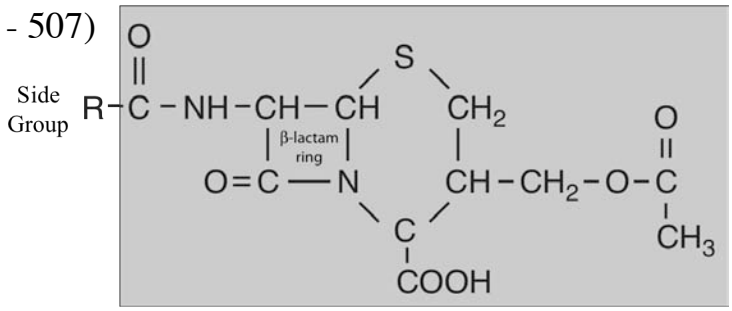
a. Ampicillin

b. Amoxicillin

c. Amoxicillin and β-Lactamase Inhibitors (Augmentin)

B. Cephalosporins (Pages 506 - 507)

i. General Information



ii. Generations (Partial list, there are now fourth generation cephalosporins):

a.

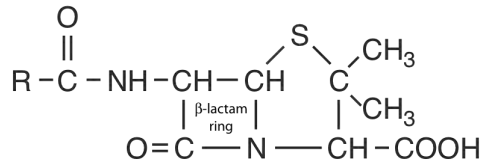
First Generation:	*Second Generaion:*	*Third Generation:*
• Cefadroxil	• Cefaclor	• Cefixime
• Cefazolin	• Cefamandole	• Cefoperazone
• Cephalexin	• Cefmetazole	• Cefotaxime
• Cephalothin	• Cefonicid	• Cefpodoxime
• Cephapirin	• Ceforanide	• Ceftazidime
• Cephradine	• Cefotetan	• Ceftizoxime
	• Cefoxitin	• Ceftriaxome
	• Cefprozil	
	• Cefuroxime	
	• Loracarbef	

iii. Mechanism

iv. Side Effects

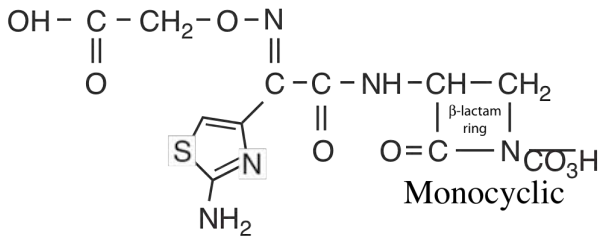
C. Monobactams (Page 507)

Penicillin



Bicyclic

Monobactam



Monocyclic

http://www.sciencedirect.com/science/article/pii/S0960894X07007962

D. Bacitracin (Page 507 - 508)

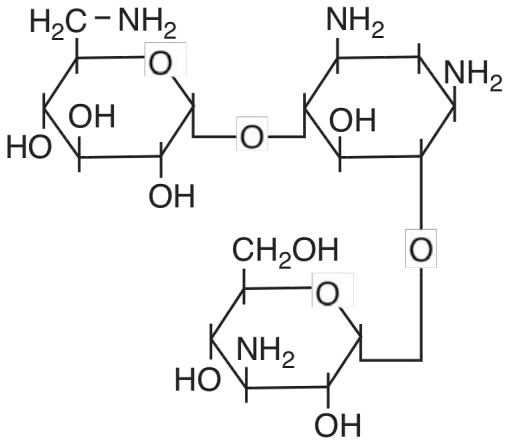
i. General Information

ii. Mechanism

iii. Side Effects

5. Inhibition of Protein Synthesis (Pages 508 - 509)

A. Aminoglycosides (Page 508)



i. General Information

- Amino Group (- NH_2)

ii. Mechanism

iii. Administration

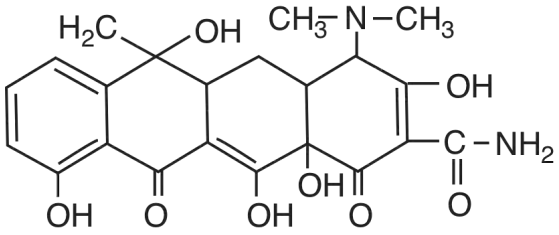
iv. Side Effects

- Neomycin

Relative ototoxicity:
neomycin > streptomycin > kanamycin > amikacin, gentamicin, tobramycin, netilmicin

B. Tetracyclines (Page 508)

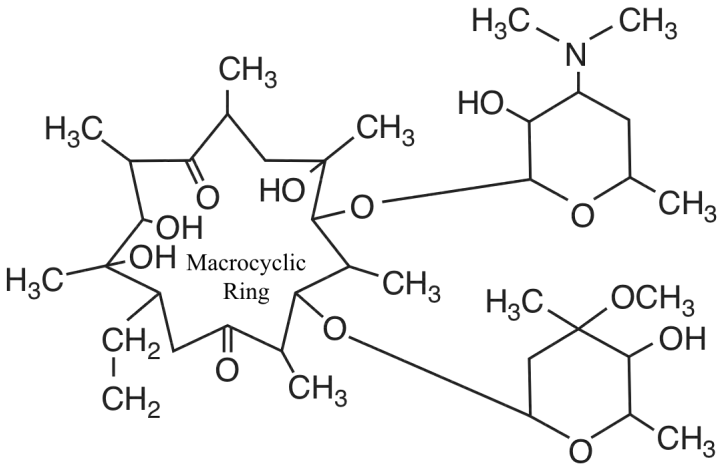
i. General Information



ii. Mechanism

iii. Side Effects

C. Macrolides (Erythromycin) (Page 508)



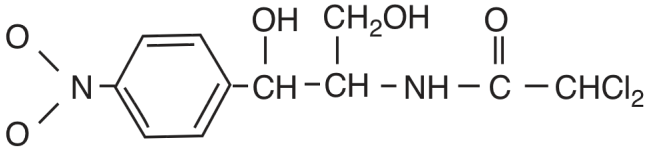
i. General Information

ii. Mechanism

iii. Side Effects

iv. Resistance

D. Chloramphenicol (Page 508)



i. General Information

ii. Mechanism

iii. Side Effects

6. Inhibition of Nucleic Acid Synthesis (Page 509)

A. Rifamycin (Rifampin)

i. General Information

ii. Mechanism

iii. Side Effects

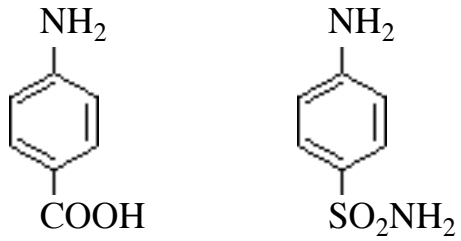
7. Competitive Inhibition (Page 510)

A. Sulfonamides

i. How they work

- Synergism

ii. Methods of Resistance



PABA *Sulfonilamide*

B. Trimethoprim

Blocked by Sulfonamides → PABA ⇩ Dihydrofolic Acid

Blocked by Trimethoprim → ⇩ *(Dihydroloate Reductase)* Tetrahydrofolic Acid

- Bactrim

8. Disruption of the Plasma (Cell) Membrane (Page 510)

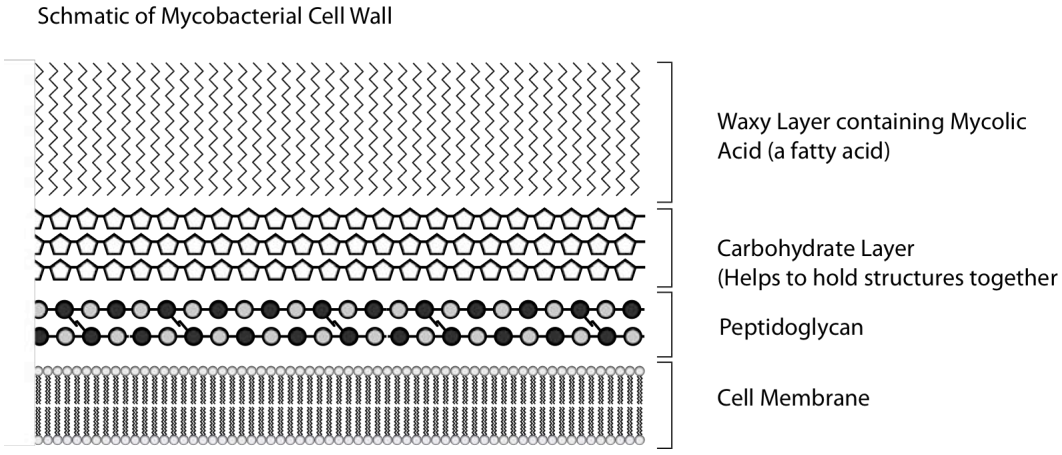
A. Polymyxins

i. General Information

ii. Mechanism

iii. Side Effects

9. Mycobacterial Antibiotics (Pages 510 - 511)



A. Mycobacteria Cell walls

i. Mycolic Acids

B. Isoniazid (INH)

i. *Mycobacterium tuberculosis*

C. Ethambutol

10. Resistance by Bacteria to Drugs

11. Antiviral Drugs (Pages 522 - 524)

    A. Modes of Action

        i. Inhibit Viral Entrance

        ii. Inhibit Uncoating Step

        iii. Interfere with nucleic Acid Synthesis

            a. Nucleoside Analogs (SEE HANDOUT)

                * Acyclovir

        iv. Integrase Inhibitors HIV (Page 524)

        v. Interfere with Assembly (Page 524)

            a. Protease Inhibitors

            b. Neuraminidase Inhibitors