

## Pathogens of the Respiratory System

### Chapter 21, Pages 531 - 567

#### 1. Respiratory System Introduction

##### A. Anatomy (Pages 532 - 534)

##### i. Upper Respiratory Track

a. Nasal Hairs

b. Paranasal Sinuses

c. Nasal Conchae

d. Ciliated Pseudostratified Columnar Epithelia

e. Pharynx

f. Epiglottis

g. Tonsils

- Pharyngeal Tonsils (Adenoids)

- Palatine Tonsils

- Lingual Tonsils

h. Eustachian Tube and Inner ear

##### ii. Normal Flora of Upper Respiratory Tract

a. *Staphylococcus aureus*

2. *Streptococcus sp.* (Page 534)

A. General Information

B. Taxonomy (Pages 534 - 535)

i. Blood Agar

a.  $\alpha$ -hemolytic (Viridans)

b.  $\beta$ -hemolytic

- Hemolysins

- Antigenic Carbohydrates (A-T) (Page 535)

c.  $\gamma$ -hemolytic

C. *Streptococcus pyogenes* “Group A  $\beta$ -hemolytic Streptococci”

i. Antigenic Protein - M protein (Page 535)

ii. Other Virulence Factors

a. DNase

b. Hyaluronidase

c. Streptokinase

d. Streptolysins O and S

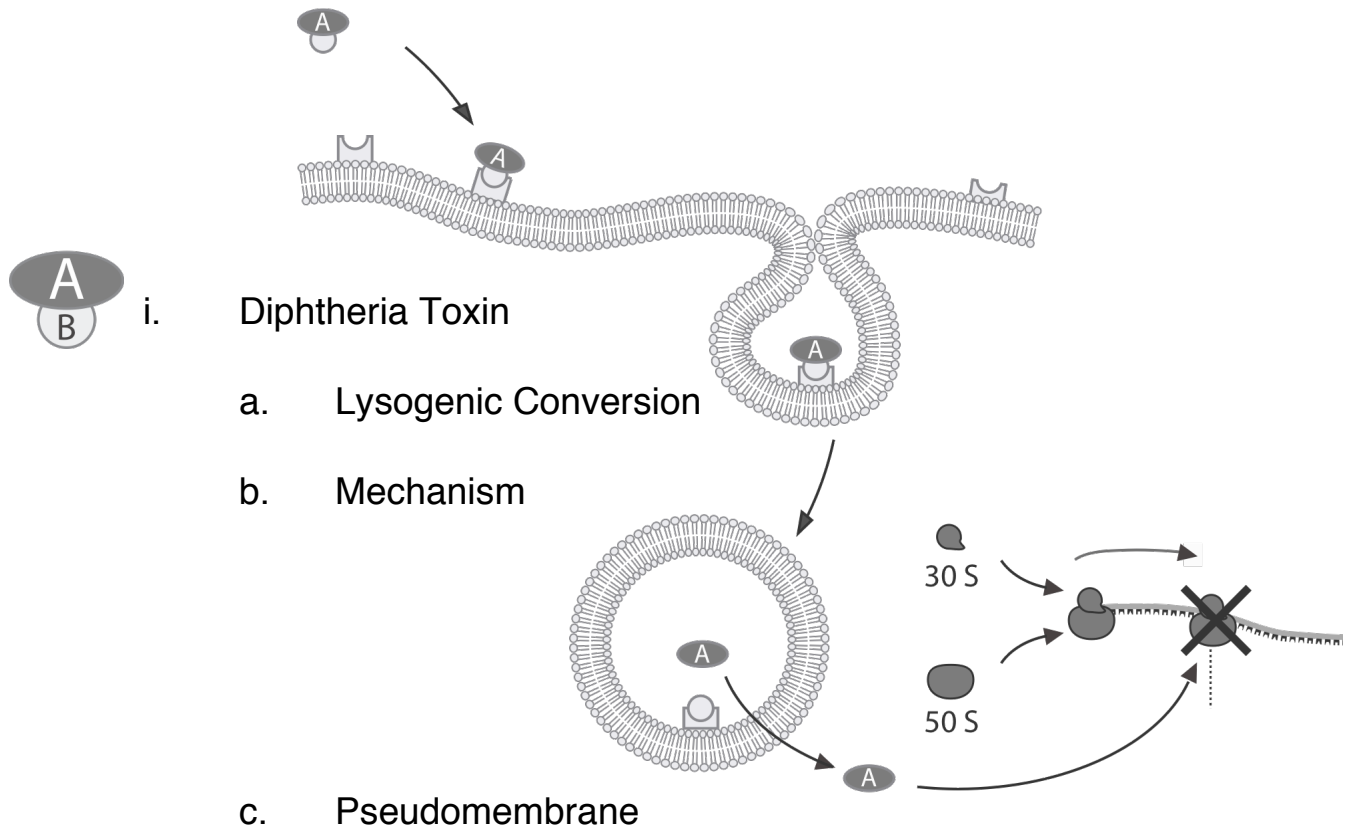
e. Erythrogenic Toxin

f. Leukocidin

- iii. Diseases of Group A  $\beta$ -hemolytic Streptococci
  - a. Pharyngitis (“Strep Throat”)
    - Scarlet Fever (p. 683)
      - \* Lysogenic Conversion
      - \* Erythrogenic Toxin (Page 536)
  
    - “Flesh Eating” *Streptococcus pyogenes*
      - \* Necrotizing Fasciitis
      - \* “Super Antigens”
  
- iv. Late Nonsuppurative Sequelae (Pages 537 - 538)
  - a. Rheumatic Fever
  
  
  - b. Glomerulonephritis

3. *Corynebacterium diphtheriae* (Pages 538 - 541)

A. Virulence Factors



B. Treatment

- i. Antisera
- ii. Tracheotomy
- iii. Antibiotics

C. Prevention by Vaccine

- i. Children - DTaP
  - b. Diphtheria Toxoid
- ii. Adult - Td

- D. *Streptococcus pneumoniae* (ages 541 - 543; 546 - 548)
- i. General Information (Pages 546 - 547)
  - ii. Virulence Factors
    - a. Polysaccharide Capsule (Pages 546 - 547)
      - 90 Serotypes
      - C3b Complement Interference (Page 547)
    - b. Hemolysin
    - c. Leukocidin
    - d. Hyaluronidase
  - iii. Diseases
    - Lobar pneumonia (Page 547)
    - Bacteremia (Page 547)
    - Meningitis (Page 547)
    - Otitis media (Page 542 - 543)
  - iv. Vaccines (Pages 547 - 548)
    - PPSV23 (Pneumococcal Polysaccharide Vaccine, 23 Serotypes)
    - PCV13 (Pneumococcal Conjugate Vaccine, 13 Serotypes)

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    - a. Lobar pneumonia (Page 547)
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    - c. Meningitis (Page 547)
    - d. Otitis media (Page 542 - 543)
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    - a. PPSV23 (Pneumococcal Polysaccharide Vaccine, 23 Serotypes)
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5. *Haemophilus influenzae* (Hib) (Pages 541 - 543)

A. Virulence Factors

- i. Capsule (type b)

B. Diseases

- i. Meningitis
  - Brain Damage
- ii. Acute Epiglottitis
- iii. Middle Ear Infections (Otitis Media)
- iv. Hib Vaccine
  - a. Conjugated Vaccine

6. *Klebsiella Pneumoniae* (Pages 548 - 549)

A. Transmission (Pages 548)

B. Virulence Factor

i. Capsule

- C3b Complement Interference, probable

ii. Colonization Factors (Adhesins) (Page 548)

iii. Cytotoxic

iv. Resistance

- plasmid borne  $\beta$ -lactimase producers
- Extended spectyrum  $\beta$ -lactimase producers effect also cephalosporins
- Carbapenem resistant - Carbamenems have  $\beta$ -lactum ring and used as a last resort.



7. *Mycoplasma pneumoniae* (Pages 549 - 550)

Note: “Atypical” Pneumonias consist of  
Mycoplasmas  
Respiratory viruses  
Chlamydias (psittacosis)  
Rickettsiae (Q fever)  
Legionella  
*Characteristics*

A. Virulence Factors

- i. Crowded conditions
  - a. Aerosolized Droplets
- ii. Autoimmune Response

B. Diseases

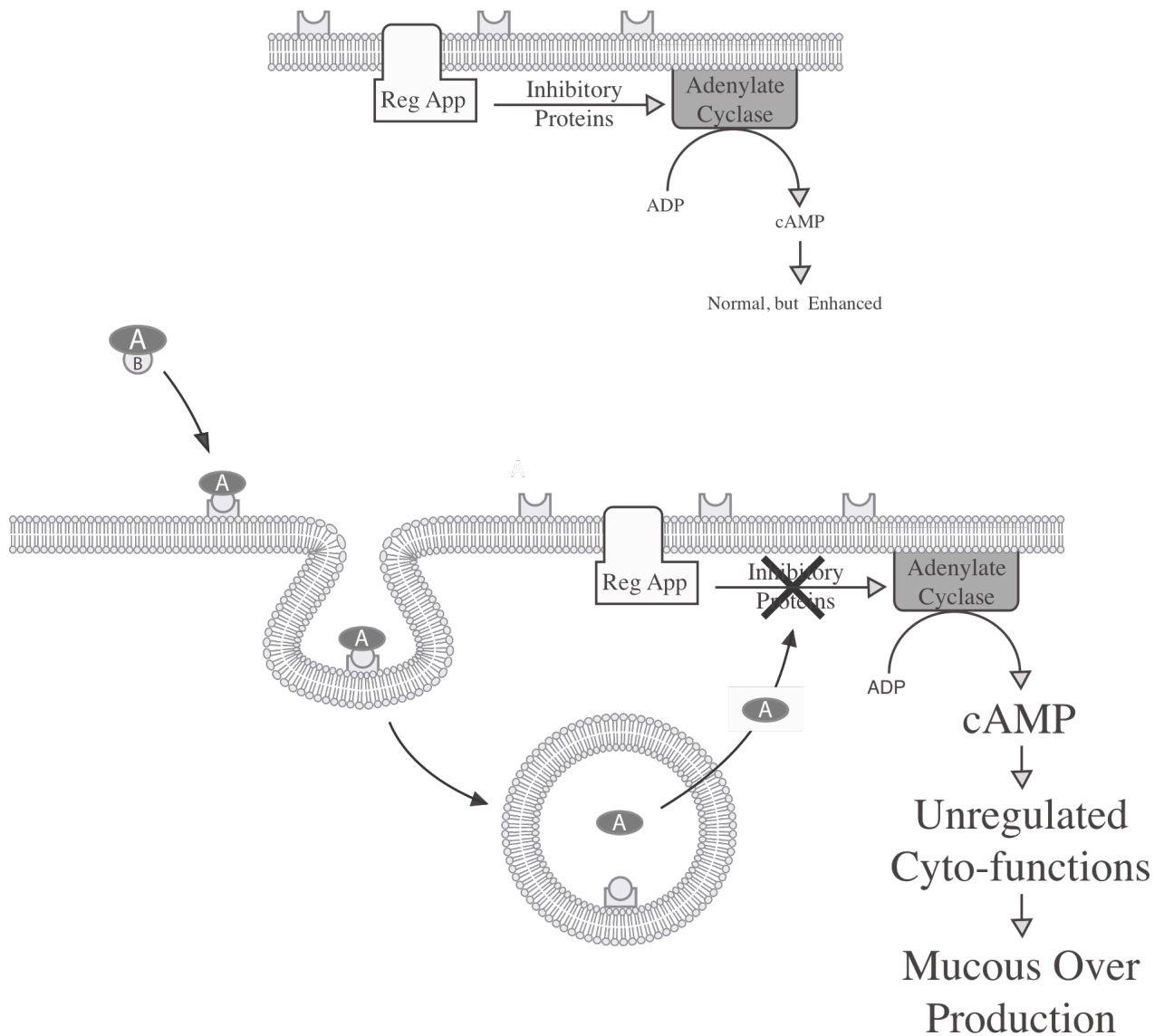
- i. Mycoplasmal pneumonia (or Primary Atypical Pneumonia or “Walking Pneumonia”)

C. Drugs

8. *Bordetella pertussis* (Pages 550 - 551)

A. Virulence Factor

- i. Colonization Factors
- ii. Tracheal Cytotoxin
- iii. Pertussis toxin (A-B Exotoxin)



- B. Disease - Whooping Cough (Pertussis)
  - i. Stages
    - a. Catarrhal Stage
    - b. Paroxysmal Stage
    - c. Convalescence Stage
  - ii. Vaccine
    - a. Whole Cell
    - b. Purified Cell Fraction (aP - Acellular Pertussis Vaccine)
  - iii. Contemporary State
    - a. DTaP Vaccine
    - b. Tdap Booster

9. *Mycobacterium tuberculosis* (Pages 551 - 556)

A. Historical Perspective

B. Transmission

C. Latent Tuberculosis Infection (LTBI) (Page 552 ff)

D. Tuberculosis Disease (Pages 553 - 554)

i. Primary Infection

ii. Caseation Necrosis

iii. Miliary Tuberculosis

- Tuberculous Meningitis - etc etc etc

E. Chemotherapy

i. First line - 8 weeks

Isoniazid (INH)

Rifampin

Pyrazinamide

Ethambutol

Then - 18 weeks

Isoniazid (INH)

Rifampin

ii. Second line

Aminosalicylic acid & salts

Capromycin

Cycloserine

Ethionamide

Streptomycin

F. Diagnosis

- i. Tuberculin Skin Test (Mantoux test)
- ii. Blood tests
- iii. x ray

G. Vaccine

- i. *Mycobacterium bovis*

H. AIDS Patients

I. Epidemic

10. *Legionella pneumophila* (Pages 556 - 557)

A. Historical Perspective

B. Overview

C. Diseases

- i. Legionnaires' Disease