CHAPTER 24: MICROBIAL DISEASES OF THE RESPIRATORY SYSTEM

I. ANATOMY AND DEFENSE MECHANISMS

A. Anatomy

B. Defense Mechanisms
   1. Coarse hairs
   2. Ciliated mucous membranes of the nose and throat
   3. Lymphoid tissue (Secondary)
   4. Ciliary escalator
   5. Alveolar macrophages
   6. Secretory IgA

II. UPPER RESPIRATORY TRACT INFECTIONS

A. Strep Throat

B. Scarlet Fever

C. Diphtheria

D. Otitis Media
   1. Streptococcus pneumoniae
   2. Haemophilus influenzae

E. Sinusitis

F. Colds
G.  Mononucleosis

III.  LOWER RESPIRATORY INFECTIONS

A.  Pertussis

B.  Community Acquired Pneumonias; Bacterial
1.  S. pneumoniae
2.  H. influenzae
3.  Mycoplasma pneumoniae
4.  Legionellosis
5.  Chlamydia pneumoniae

C.  Community Acquired Viruses
1.  Respiratory Syncytial Virus
2.  Influenzae virus
3.  Herpes varicella-very rare
4.  Hantavirus

D.  Nosocomial Pneumonias
1.  Staphylococcus aureus
2.  Pseudomonas aeruginosa
3.  Other Gram negative rods
D. Fungal Diseases
1. Histoplasmoisis
2. Coccidiodomycosis
3. Aspergillus fumigatus

IV. TUBERCULOSIS INTRODUCTION
A. Decline Of TB As A Public Health Threat
B. Resurgence Beginning In 1985
C. New Threat In Addition To Seriousness Of Infection
D. Population At Greatest Risk
   1. Homeless
   2. Prisoners, IV drug abusers
   3. Immigrants
      a. Mexico
      b. Philippines
      c. Vietnam
   4. Persons with AIDS

V. PATHOGENESIS
A. Route Of Transmission
   1. Aerosol
   2. Unpasteurized milk
B. Primary Infection
   1. Bacterium inhaled and phagocytized by macrophages
   2. Organisms multiply; irritate lung tissue
   3. Fluid, lymphocytes and macrophages accumulate in lungs; destroy bacteria or engulf
   4. A tubercle is formed and infection arrested
   5. Tubercle calcifies
C. Progressive Tuberculosis
   1. Tubercle not formed
   2. Lung tissue destroyed; cavity develops with caseous (cheesy) necrotic material; organisms multiply in air filled cavities
3. Symptoms
   a. fever
   b. night sweats
   c. cough
   d. fatigue

D. Reactivated Tuberculosis
   1. Cell mediated immunity no longer functioning or reduced function due to age, disease, therapy
   2. Calcified tubercle breaks down
   3. Same course as progressive disease

VI. MYCOBACTERIUM TUBERCULOSIS — THE ORGANISM
   A. Gram Positive Bacilli; Acid-Fast; Positive FA
   B. Non-Motile; No Spores; No Capsule; Obligate Aerobe
   C. Cell Wall: Contains Long Chain Fatty Acids = 60% Lipids Resistant To Drying
   D. Slow-Growing, Divides Once Every 20 Hours
   E. Usually Grows From Clinical Specimens After 3-4 Weeks On Lowenstein-Jensen Medium With 7% CO₂; Colonies “Rough And Buff”
   F. Identification: Niacin And Nitrate Positive; Or Nucleic Acid Probe; Or Gas Chromatography
   G. Susceptibility Testing
      1. Solid media - 3 weeks
      2. Radiometric - 1 week
      3. Nucleic acid probe
      4. PCR
   H. No Toxins

VII. TREATMENT
   A. Isolate Patient If Degree Of Suspicion
   B. Primary Drugs - At Least Two To Prevent Resistance Developing
   C. MDR = Multiple Drug Resistance (Resistance To 2 Or More)
      1. Primary resistance
      2. Acquired resistance
      3. Treatment with secondary choices
VIII. CONTROL AND PREVENTION

A. Early Detection
B. Improve Crowded Conditions In Holding Cells, Prisons, Detention Areas For Immigrants, Etc.
C. PPD (Tine Or Mantoux) Testing: Exposed Persons Including Families, Friends, Co-Workers, Health Workers; Children; Prison Guards, Prisoners, HIV Positive Persons; Persons With AIDS
D. Prophylactic Treatment With INH; Rifampin If INH Resistant
E. Isolation Rooms, HEPA Filters, Masks, UV Lights, Disinfectants, Laminar Flow Hoods In Microbiology Lab
F. Develop More Rapid Methods For Laboratory Detection
   1. Nucleic acid probes
   2. PCR
G. Vaccinations?
H. Surveillance - Epidemiology
I. Better Treatment Through Research
   1. Develop new drugs/antibiotics
   2. Vaccines
   3. Improve delivery system of drug
   4. Learn more about how drug resistance develops

BIBLIOGRAPHY