PLAGUES IN MAN

THE HUMAN HOST

I. INTRODUCTION
   - A. RESISTANCE AND SUSCEPTIBILITY
   - B. NONSPECIFIC VS. SPECIFIC (IMMUNITY) DEFENSES

II. NONSPECIFIC DEFENSES
   - A. BARRIER SURFACES
     - 1. THE SKIN
       - a. SKIN LAYERS
       - b. pH (BETWEEN 3 & 5)
       - c. FATTY ACIDS
       - d. SEBUM
     - 2. MUCOUS MEMBRANES
       - a. MUCUS SECRETING CELLS
       - b. CILIATED CELLS
       - c. LAVAGING
     - 3. SPECIAL ENZYMES
       - a. LYSOZYME
       - b. PROTEASES
     - 4. THE pH OF THE STOMACH
     - 5. THE EYE (TEARS AND LYSOZYME)
   - B. PHAGOCYTOSIS
     - 1. BLOOD CELL TYPES
       - a. ERYTHROCYTES
       - b. THROMBOCYTES
       - c. LEUKOCYTES
         - 1) LYMPHOCYTES
         - 2) GRANULOCYTES (NEUTROPHILS)
         - 3) MONOCYTES --> MACROPHAGE
     - 2. PROCESS
       - a. CHEMOTAXIS
       - b. ADHERENCE
       - c. INGESTION
       - d. DIGESTION – 2 TYPES
         - 1) ENZYMATIC REACTIONS
         - 2) 0_2 REACTIONS
   - C. INFLAMMATION -- "rubror et tumor cum calore et dolore"
     - 1. VASODILATION & PHAGOCYTE MIGRATION
     - 2. PHAGOCYTOSIS
     - 3. RESOLUTION
     - 4. FEVER AND IL-1
     - 5. PAIN (PRESSURE; BRADYKININS, PROSTAGLANDINS)
   - D. COMPLEMENT
     - 1. THE COMPLEMENT CASCADE
     - 2. CYTOLYSIS
     - 3. OPSONIZATION
   - E. INTERFERONS (IFNs)
     - 1. INDUCTION
     - 2. MODE OF ACTION
       - a. INHIBIT PROTEIN SYNTHESIS
       - b. REQUIRE ds RNA (VIRAL BYPRODUCT)

III. SPECIFIC DEFENSES: THE IMMUNE RESPONSE
- A. ACQUIRED IMMUNITY
  - 1. NATURALLY ACQUIRED ACTIVE
  - 2. NATURALLY ACQUIRED PASSIVE
  - 3. ARTIFICIALLY ACQUIRED ACTIVE (IMMUNIZATION & VACCINES)
  - 4. ARTIFICIALLY ACQUIRED PASSIVE (ANTISERUM & γ-GLOBULIN)
- B. DUALITY OF THE IMMUNE SYSTEM
  - 1. THE HUMORAL IMMUNE SYSTEM
    - a. B-CELLS --> ANTIBODY PRODUCTION
    - b. INACTIVATES (BINDS TO) ANTIGENS (TOXINS AND VIRUSES), OPSONIZES CELLS & ACTIVATES COMPLEMENT
  - 2. CELL-MEDIATED IMMUNE SYSTEM
    - a. T-CELLS & CELL-KILLING ACTIVITY
    - b. RECOGNIZES (AND LYSES) FOREIGN CELLS OR HOST CELLS WITH FOREIGN ANTIGENS ON THE SURFACE
- C. HUMORAL IMMUNITY
  - 1. ANTIGENS
    - a. PROTEINS AND PROTEIN CONJUGATES
    - b. LARGE CARBOHYDRATES
    - c. ANTIGENIC DETERMINANTS
      - 1) SMALL SPECIFIC REGION OF PROTEIN <u>OR</u>
      - 2) HAPTENS--SMALL MOLECULES + CARRIER PROTEIN
  - 2. ANTIBODIES
    - a. STRUCTURE
      - 1) HEAVY CHAIN (5 TYPES- γ, μ, α, δ, ε)
      - 2) LIGHT CHAIN (2 TYPES-κ, λ)
      - 3) VARIABLE (V) AND CONSTANT (Fc) REGIONS IgG, IgM, IgA, IgD & IgE
    - b. FUNCTIONS
    - c. PRODUCTION BY MATURE B-CELLS (PLASMA CELLS)
    - d. T-DEPENDENT ANTIGENS
      - 1) ANTIGEN PRESENTING CELLS
      - 2) T_H-CELLS
    - e. MEMORY B-CELLS
  - 3. ANTIBODY DIVERSITY
    - a. HEAVY CHAIN GENE
      - 1) V, D, J AND C REGIONS
      - 2) DNA REARRANGEMENTS
      - 3) RNA SPLICING
    - b. LIGHT CHAIN GENES (κ AND λ)
- D. CELL-MEDIATED IMMUNITY
  - 1. T-CELL TYPES
  - 2. T-CELL ACTIVATION
  - 3. KILLER CELLS
- E. CLONAL SELECTION AND MEMORY
  - 1. PRIMARY RESPONSE
  - 2. ANAMNESTIC RESPONSE