I. Non-specific Immunity

A. PHYSICAL BARRIERS - [Prevent Access and initiate defenses] Integument & Accessory structures (hair, nails, glands)

B. INFLAMMATION - via Mast cells and Basophils
   ⊳ blood flow; ⊳ capillary permability, ⊳ phagocytic activities,
   ⊳ activates compliment, ⊳ walls off injury site, ⊳ activates Division II

C. FEVER - via pyrogins
   ⊳ Mobilizes defenses, ⊳ accelerates repair, ⊳ inhibits pathogens

D. COMPLEMENT [tagging] - 11 plasma ‘C’ proteins attacks & breaks down cell walls via MAC (membrane attack complex) pore formation, attracts phagocytes

E. CYTOKINES [chemical warfare] Lymph Hormones or Chemotaxic Factors
   (Direct attacks and stimulates Division II) (except Suppressor T-cell inhibitory cytokines)
   1. INTERFERONS - proteins increase resistance to viral infections & stimulate Macrophages & NKCs (alpha, beta & gamma) α & δ stim. NKCells β slow viral inflam.
   2. INTERLEUKINS - IL1-7 membrane glycoproteins via CDMs (cluster designated markers) called MHCs (major histocompatibility complex) or Cluster Designated Markers HLAs (human leukocyte antigens)
   3. MONOKINES – via monocyte-macrophages {IL-12, IL-18 and IL-15}
   4. LYMPHOTOXIN - toxic substances to pathogens via B & T cells
   5. TNF - Tumor Necrosis Factor via Macrophages; slow & kill tumor growth; activate T-cells & Eosinophils; inhibit parasites & viruses
   6. LYPNOHOKINES – chemicals (double stranded RNA) secreted by t-lymphocytes activated by antigens stimulating the production of nonsensitized lymphocytes and activating macrophages
   7. LEUKOTRIENES - lipid compounds that contain 20 carbon atoms, are related to prostaglandins, and mediate the inflammatory response
   8. COLONY STIMULATING FACTORS - via macrophages, fibroblasts, & T-cells G, M, GM, Multi formed element factors
   9. PROSTAGLANDINS - local hormones – alter the metabolism & sensitivities of other cells

F. LEUKOCYES [WBCs] Myeloid derived
   1. Monocyte-Macrophages - fixed and free big eaters [Reticuloendothelial System]
      Fixed: Langerhan Cells, Kupffer Cells, Microglea, Osteoclasts etc.
      Present antigens; Clean up after microphage battles
   2. Microphages - kamikaze little eaters
      a. Neutrophils – invading bacteria & cellular debris
      b. Eosinophils – target foreign cpds or pathogens coated with antibodies
   3. Basophils and Mast Cells - Inflammatory response
      Histamine, Heparin, Prostaglandins

G. Natural Killer Cells - Lymphoid Leukocytes [lymphocytes] [special forces unit used by both divisions] activated by double-stranded RNA or lymphokines and fights off viral infections and tumors without evident antigenic specificity
   immunological surveillance ADCC – Antibody Dependant Cell Mediated Cytotoxicity
II. Specific Immunity [Precise, Definitive]
[division 2] (three Regiments w/ Battalions)

LYMPHOID LEUKOCYTES [lymphocytes]

A. Natural Killer Cells – [immunological surveillance]
[special forces unit used by both divisions]
(ADCC) -Antibody Dependant Cell Mediated Cytotoxicity

B. T- CELLS (fort Thymus) [tissue mediated immunity]
Presentation / MHC proteins / Antigen Recognition / Costimulation

1. Cytotoxic T- cells [Killer T- cells] cell-to-cell combat
(CD8 markers) >found on Cytotoxic T-cells & suppressor T-cells <
>activated by Class I MHC proteins<
release chemotaxic factors that act as flares

2. Helper T- cells - stimulate activation of specific defenses >T, B and NKC<
(CD4 markers) >found on Helper T-cells<
>Respond to Class II MHC proteins<

3. Memory T- cells – I.D. specific invaders

4. Suppressor T- cells – Inhibit T& B Cells via inhibitory Cytokines

C. B CELLS [humoral immunity]

1. Plasma Cells (antibodies or immunoglobulins)

   IgM – 1st response to new antigen (anti-A, anti-B agglutinins)
   IgA – exocrine secretions (tears, mucus, sweat, etc.) skin, respiratory, G.I.
   IgD – extracellular fluids (ISF, CSF, Plasma, etc.) surface of B cells for activation
   IgE – Allergic response (mast cells & basophils)
   IgG – 2nd response (“anamnestic” without forgetting) crosses placenta

2. Memory B- cells – vary even in clones (Identical Twins)