Topics

Sensor systems

Phagocytosis

Inflammation

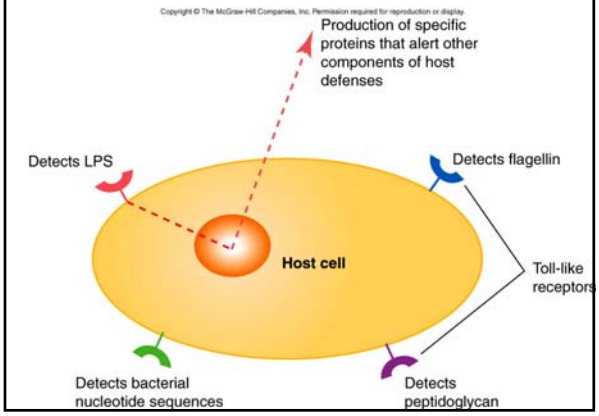
Interferons

Fever

Sensor systems

- Toll – like receptors
- Complement system
  - Classical pathway
  - Alternate pathway
  - Lectin pathway

Figure 15.6- Toll – like receptors (TLRs)



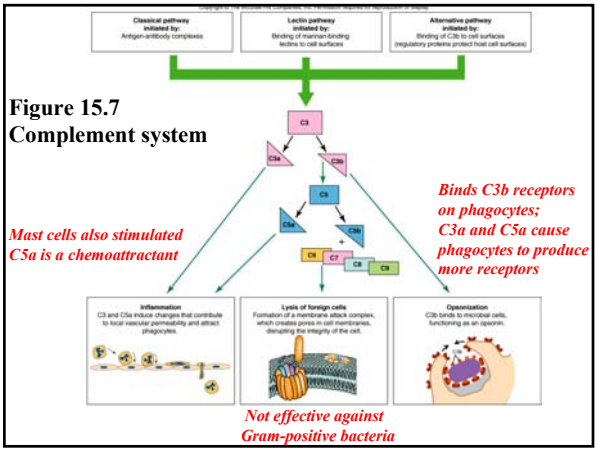


Figure 15.7
Complement system

Mast cells also stimulated C5a is a chemoattractant

Binds C3b receptors on phagocytes; C3a and C5a cause phagocytes to produce more receptors

Not effective against Gram-positive bacteria

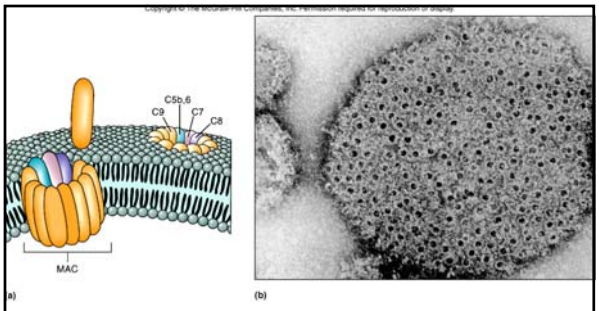


Figure 15.8
Membrane Attack Complex of Complement (MAC)

Phagocytosis

- Process of phagocytosis
- Macrophages
- Neutrophils

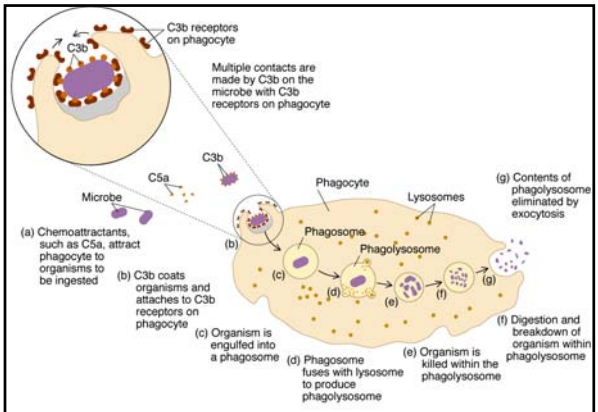
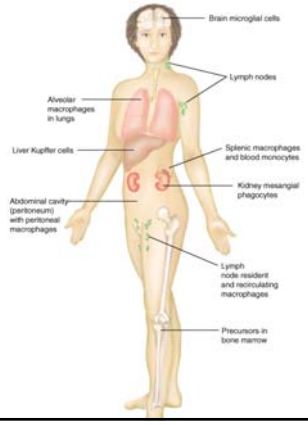


Figure 15.9 - Process of phagocytosis

Macrophages

- Located throughout the body (Kupffer cells, alveolar, etc.)
- Produce cytokines
- Interact with T helper cells – activated macrophages
- Help form granulomas
- *Have Toll-like receptors and are stimulated by microbial substances*

Figure 15.5 – Mononuclear Phagocytes



Neutrophils

- First to arrive during an immune response
- Involved in inflammation
- Inherently have more killing power than macrophages

Inflammation

- Initiation
- Inflammatory process
- Outcomes of inflammation

Initiation

- Microbial products (LPS, flagellin, DNA)
  trigger toll-like receptors on macrophages
  macrophages make cytokines (TNFα)
  TNFα causes liver to secrete acute phase proteins
  acute phase proteins facilitate phagocytosis and complement activation
- Complement cascade
  Triggered by microbial surfaces
  Activates mast cells to secrete inflammatory cytokines
- Tissue damage

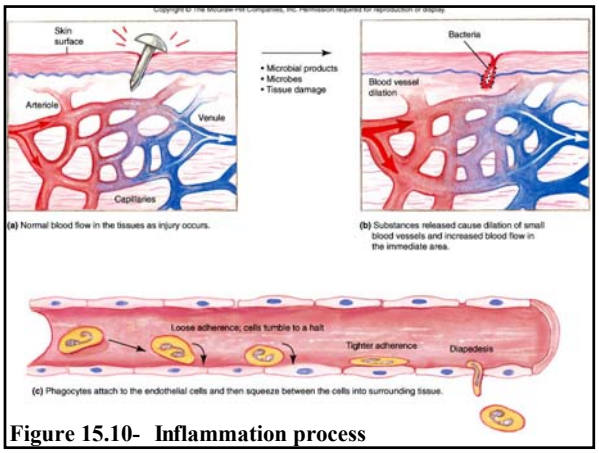
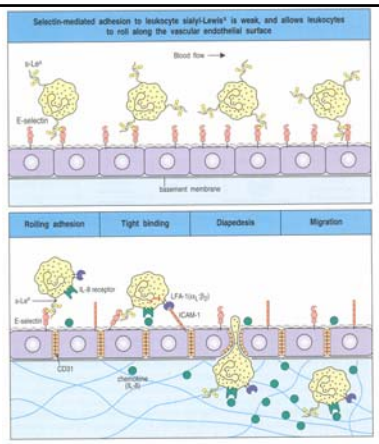


Figure 15.10- Inflammation process



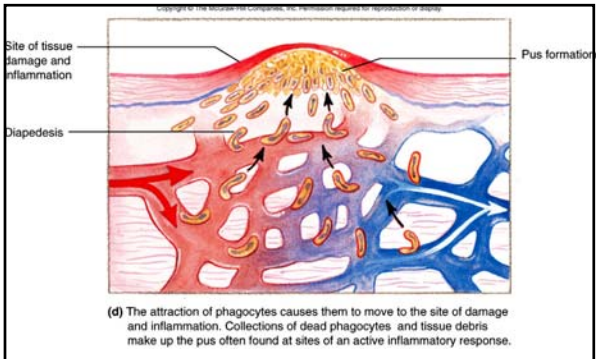


Figure 15.10- Inflammation process

Outcomes of inflammation

- **Damage to surrounding tissue**
  caused by toxic products of phagocytes
- **Release of bacterial endotoxins**
  released as LPS from Gram negative bacteria
  stimulates inflammation, loss of blood pressure
  bloodstream infection = septic shock
- **Damage to surrounding tissue**
- **Eliminate invading pathogen**

Interferons

- **Glycoproteins**
- **Control viral infections**

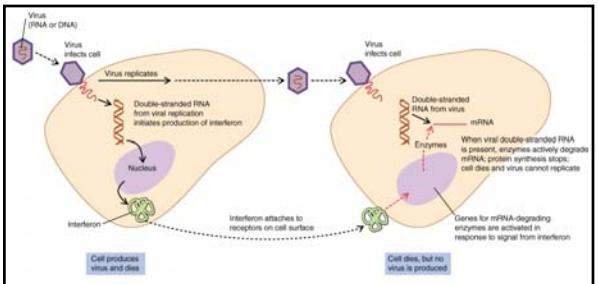


Figure 15.11 - Interferons

Fever

- Hypothalamus controls temperature
- Pyrogens (endogenous or exogenous)
  cytokines that induce fever via hypothalmus

Fever

- Hypothalamus controls temperature
- Pyrogens (endogenous or exogenous)
- High temperature inhibits pathogen growth