Topics

Sensor systems

Phagocytosis

Inflammation

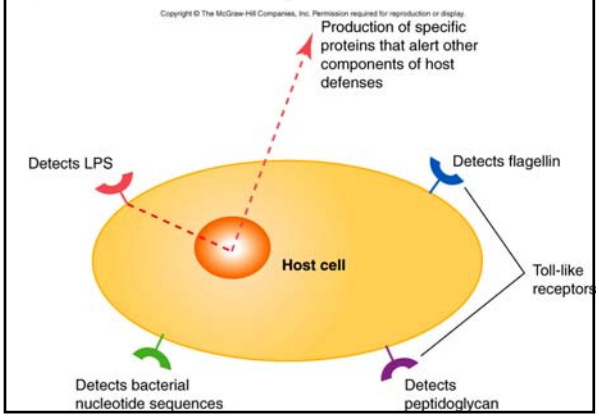
Interferons

Fever

Sensor systems

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

Figure 15.6- Toll – like receptors (TLRs)



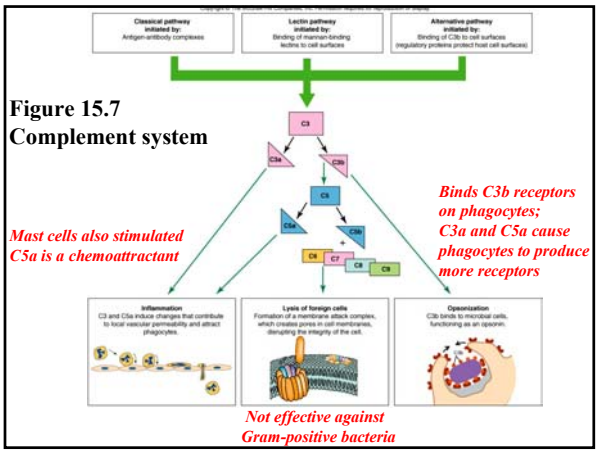


Figure 15.7
Complement system

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

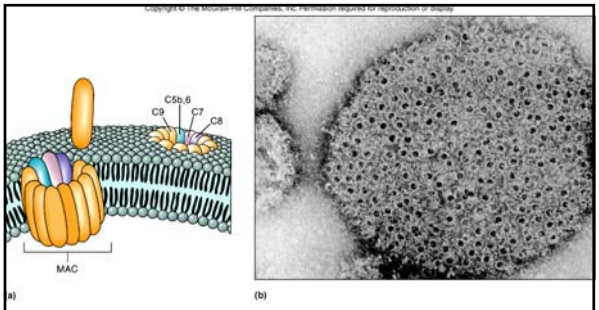


Figure 15.8
Membrane Attack Complex of Complement (MAC)

Phagocytosis

- Process of phagocytosis
- Macrophages
- Neutrophils

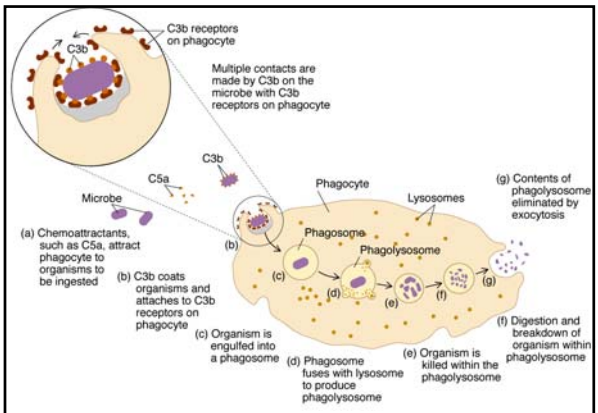
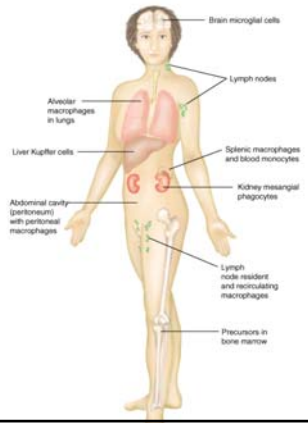


Figure 15.9 - Process of phagocytosis

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

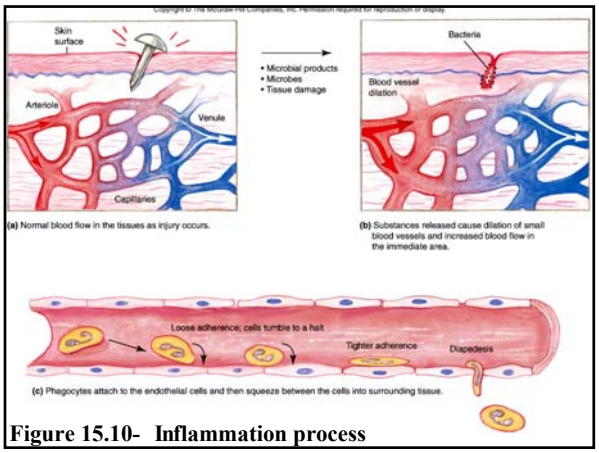
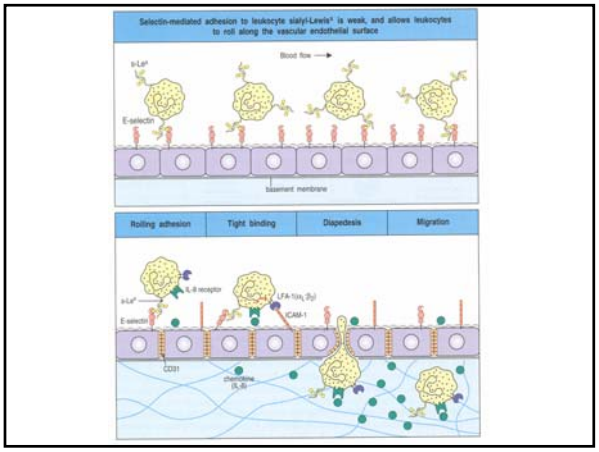


Figure 15.10- Inflammation process



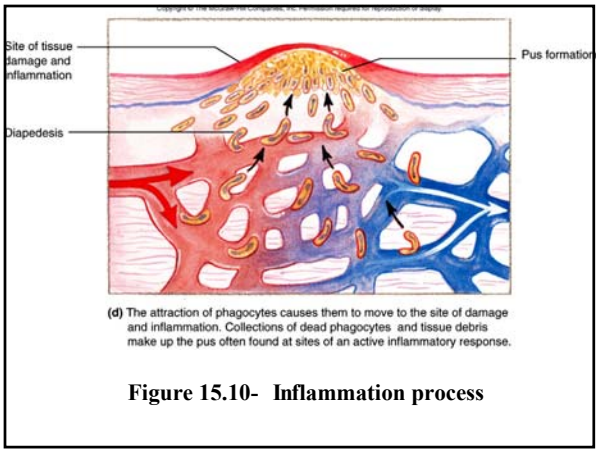


Figure 15.10- Inflammation process

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

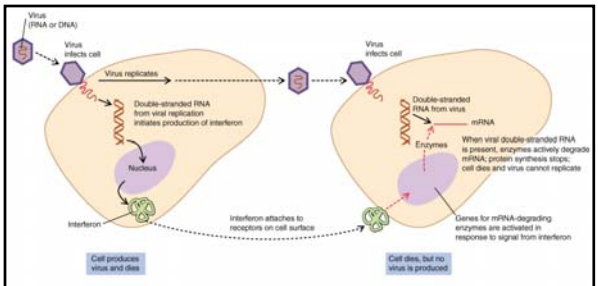


Figure 15.11 - Interferons

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