

# *The Body's Defenses*

Benjamin  
Cummings

# Lines of Defense

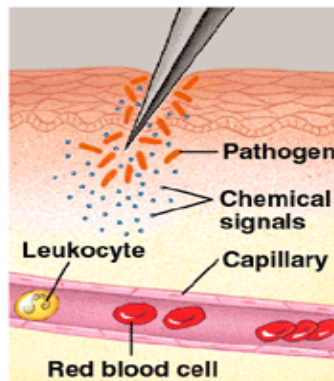
Nonspecific defense mechanisms		Specific defense mechanisms (immune system)
First line of defense	Second line of defense	Third line of defense
<ul style="list-style-type: none"><li>• Skin</li><li>• Mucous membranes</li><li>• Secretions of skin and mucous membranes</li></ul>	<ul style="list-style-type: none"><li>• Phagocytic white blood cells</li><li>• Antimicrobial proteins</li><li>• The inflammatory response</li></ul>	<ul style="list-style-type: none"><li>• Lymphocytes</li><li>• Antibodies</li></ul>

Copyright © Pearson Education, Inc., publishing as Benjamin Cummings.

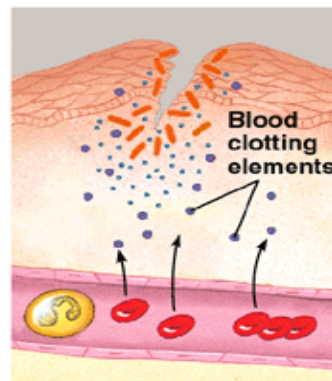
## Nonspecific Defense Mechanisms.....

# The Inflammatory Response

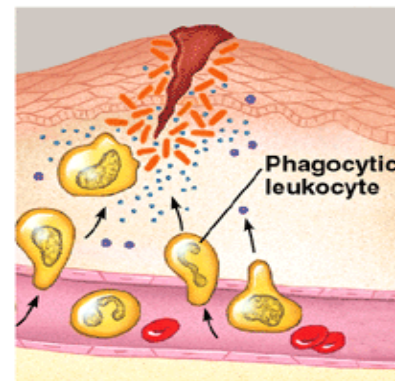
- 1- Tissue injury; release of chemical signals
- 2 - Dilation and increased permeability of capillary
- 3 - Phagocytosis of pathogens~
  - fever & pyrogens



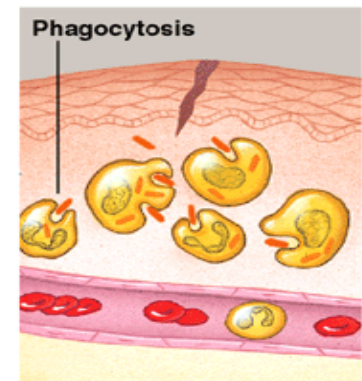
1



2



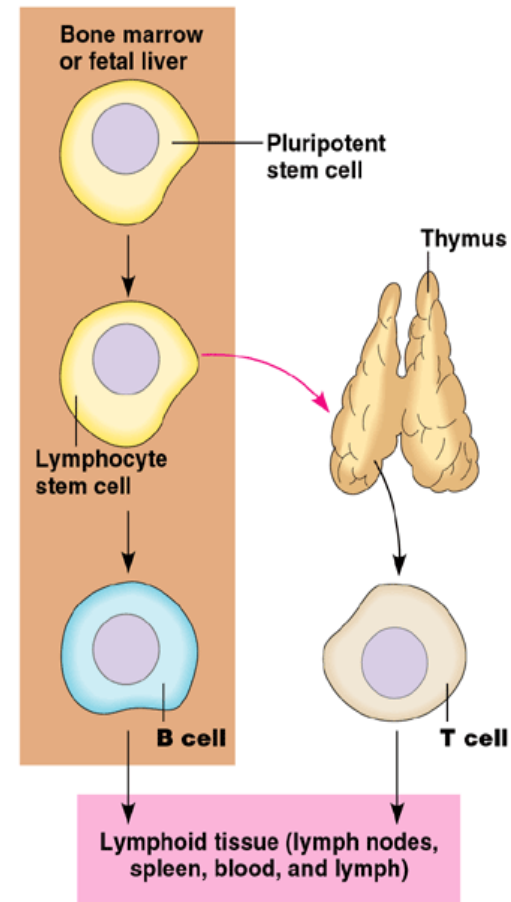
3



4

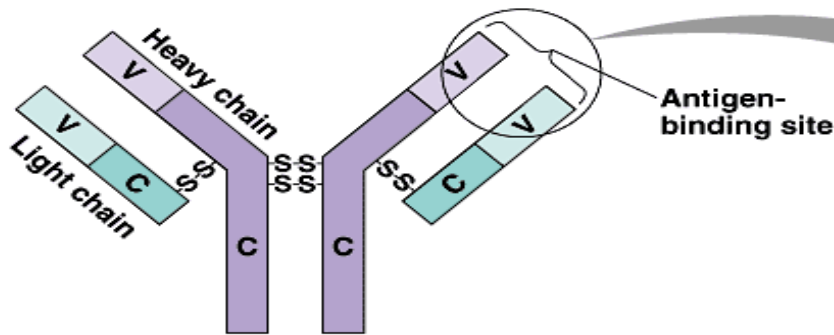
# Specific Immunity

- Lymphocytes
  - pluripotent stem cells...
  - B Cells (bone marrow)
  - T Cells (thymus)
- Antigen: a foreign molecule that elicits a response by lymphocytes (virus, bacteria, fungus, protozoa, parasitic worms)
- Antibodies: antigen-binding immunoglobulin, produced by B cells
- Antigen receptors: plasma membrane receptors on B and T cells

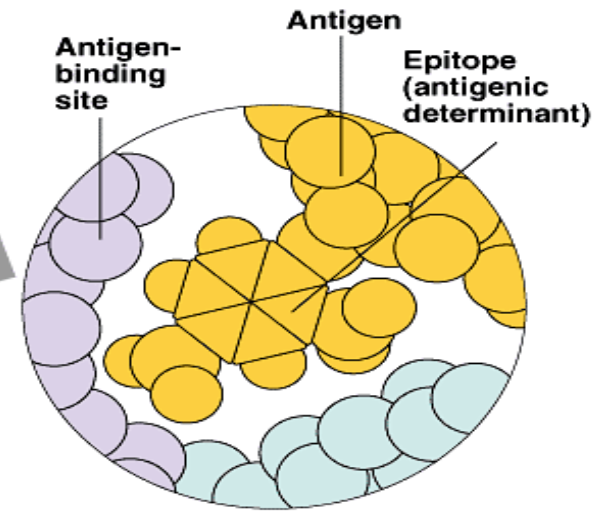


# Antibody Structure & Function

- Epitope: region on antigen surface recognized by antibodies
- 2 heavy chains and 2 light chains joined by disulfide bridges
- Antigen-binding site (variable region)



(a) Basic structure of an antibody molecule



(b) Close-up view of an antigen-binding site with bound antigen

# Immunity in Health & Disease

- Active immunity/natural: conferred immunity by recovering from disease
- Active immunity/artificial: immunization and vaccination; produces a primary response
- Passive immunity: transfer of immunity from one individual to another
  - natural: mother to fetus; breast milk
  - artificial: rabies antibodies



# Abnormal immune function

- Allergies (anaphylactic shock): hypersensitive responses to environmental antigens (allergens); causes dilation and blood vessel permeability (antihistamines); epinephrine
- Autoimmune disease: multiple sclerosis, lupus, rheumatoid arthritis, insulin-dependent diabetes mellitus
- Immunodeficiency disease: SCIDS (bubble-boy); A.I.D.S.

