The second line of defense

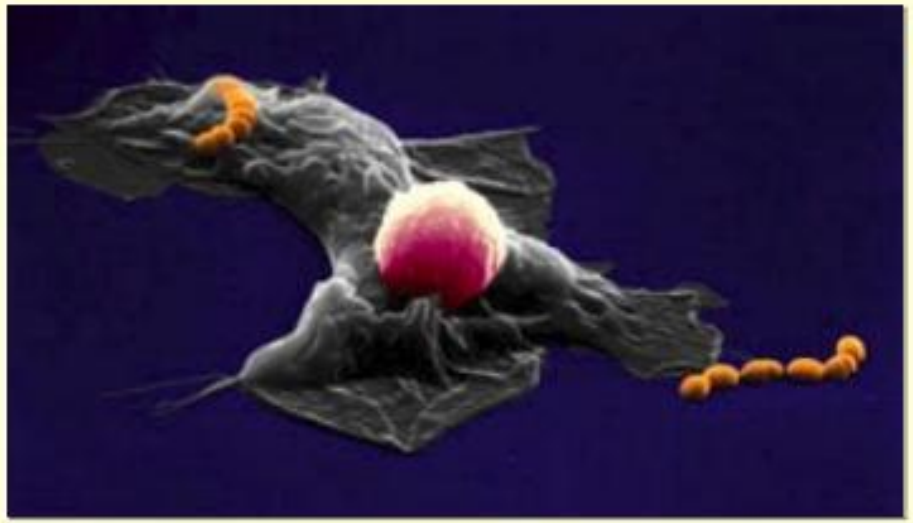
- nonspecific resistance that destroys invaders in a generalized way without targeting specific individuals.
-- involves a group of cells, tissues and organs that work together to protect the body.

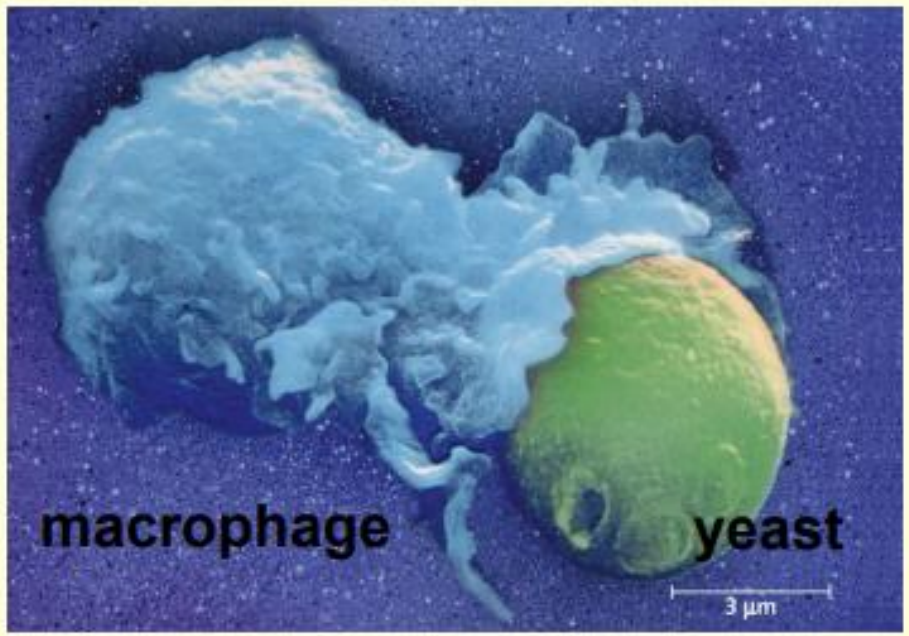
Defensive cells
Defensive proteins
Inflammation
Fever

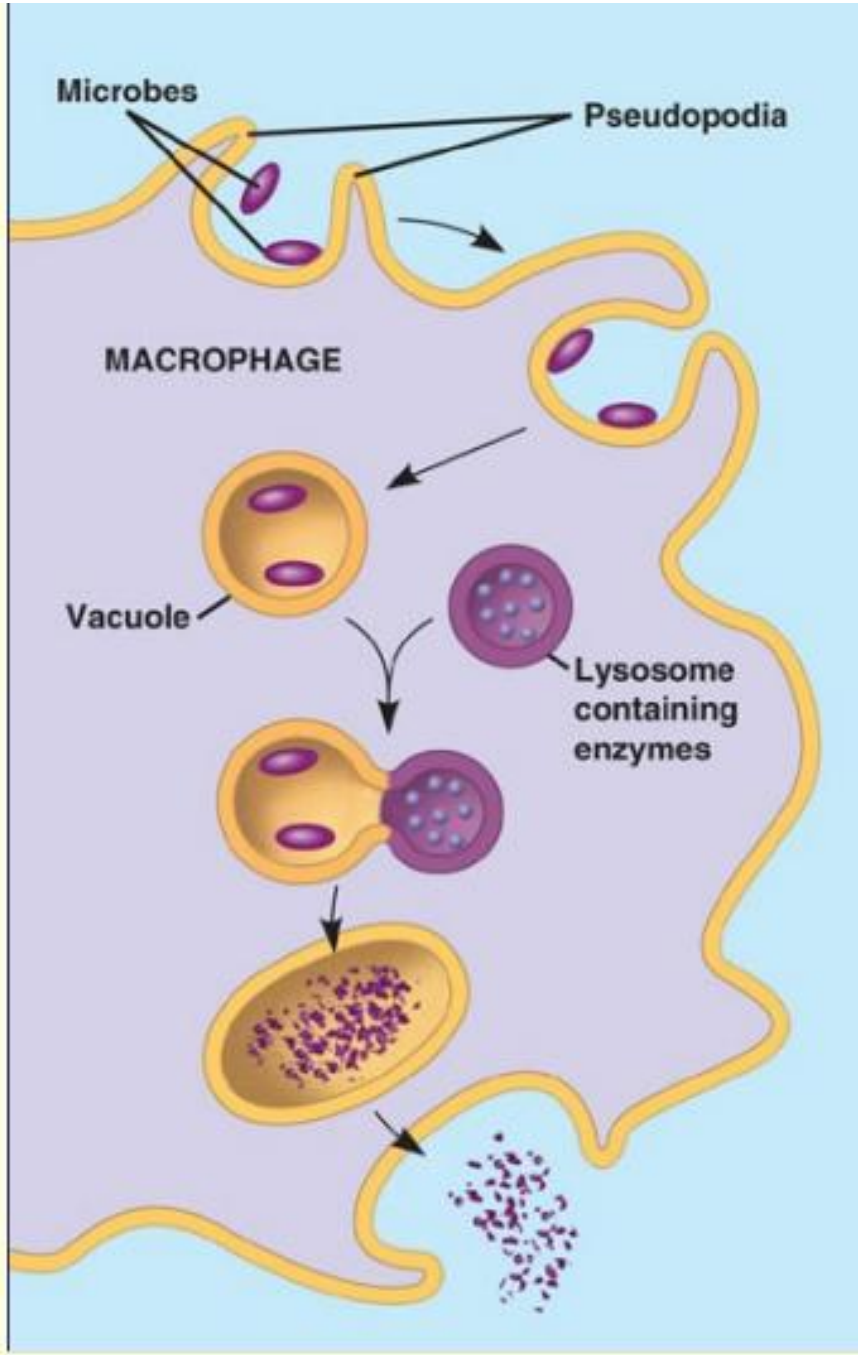
Defensive Cells

- If a pathogen penetrates the first line of defense, these cells play a role in inhibiting or destroying the pathogen before it harms the body. They are non-specific and react to the presence of any foreign organism or substance
- Phagocytes
  - Engulf pathogens, damaged tissue, or dead cells
    - Neutrophils
    - Macrophages
- Eosinophils
  - Discharge destructive enzymes to destroy pathogens too big for phagocytes (e.g., parasitic worms)
- Natural Killer Cells
  - Seek out abnormal cells (e.g., cancer cells)

Phagocytes




macrophage
yeast
3 µm


Microbes
Pseudopodia
MACROPHAGE
Vacuole
Lysosome containing enzymes

Defensive Proteins

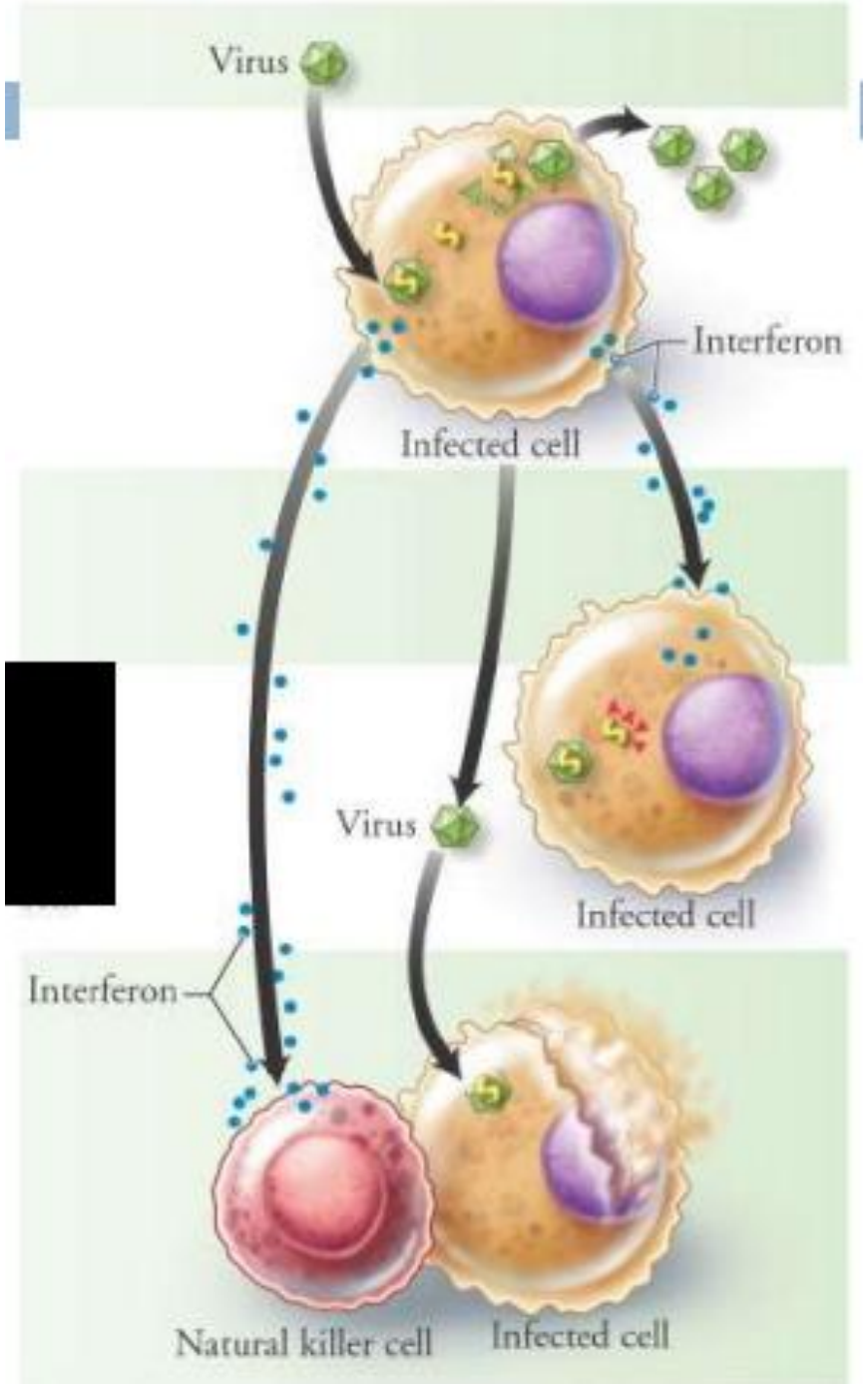
Interferon Protein

- A virus enters a cell

-The infected cell produces interferon

-The interferon binds with other cells that become infected with a virus, and protects it by stimulating the cell to produce antiviral proteins that prevent the virus from making copies of itself

-The interferon attracts and stimulates natural killer cells and macrophages to kill cells infected with the virus



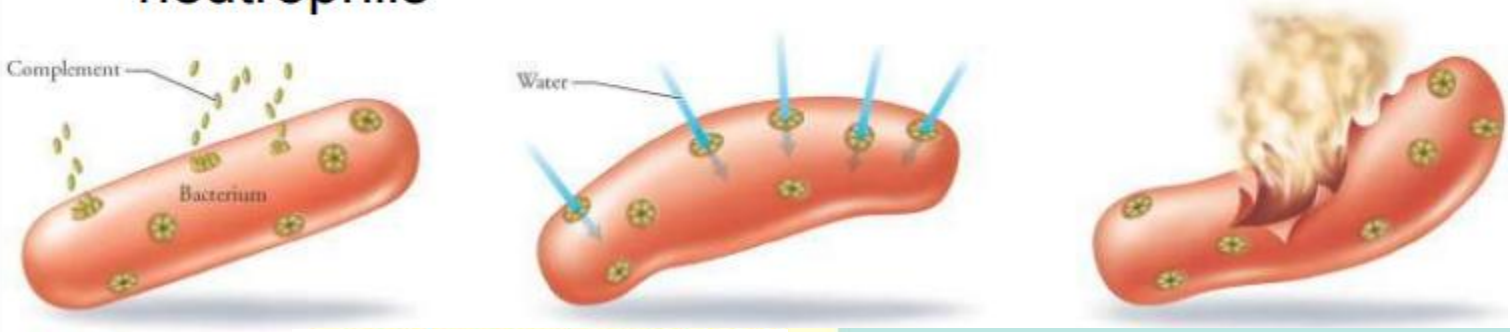
Complement System

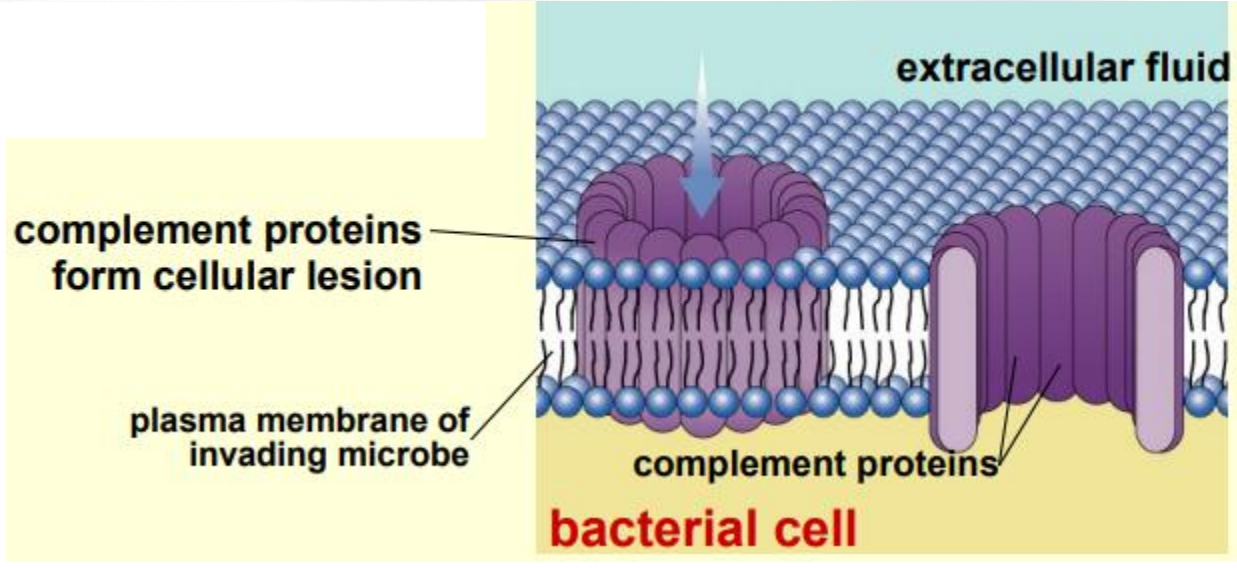
-Destruction of pathogen (Cell lysis)

-Enhancement of phagocytosis (Opsonization)

-Stimulation of inflammation

-Chemotaxis - attracting macrophages and neutrophils

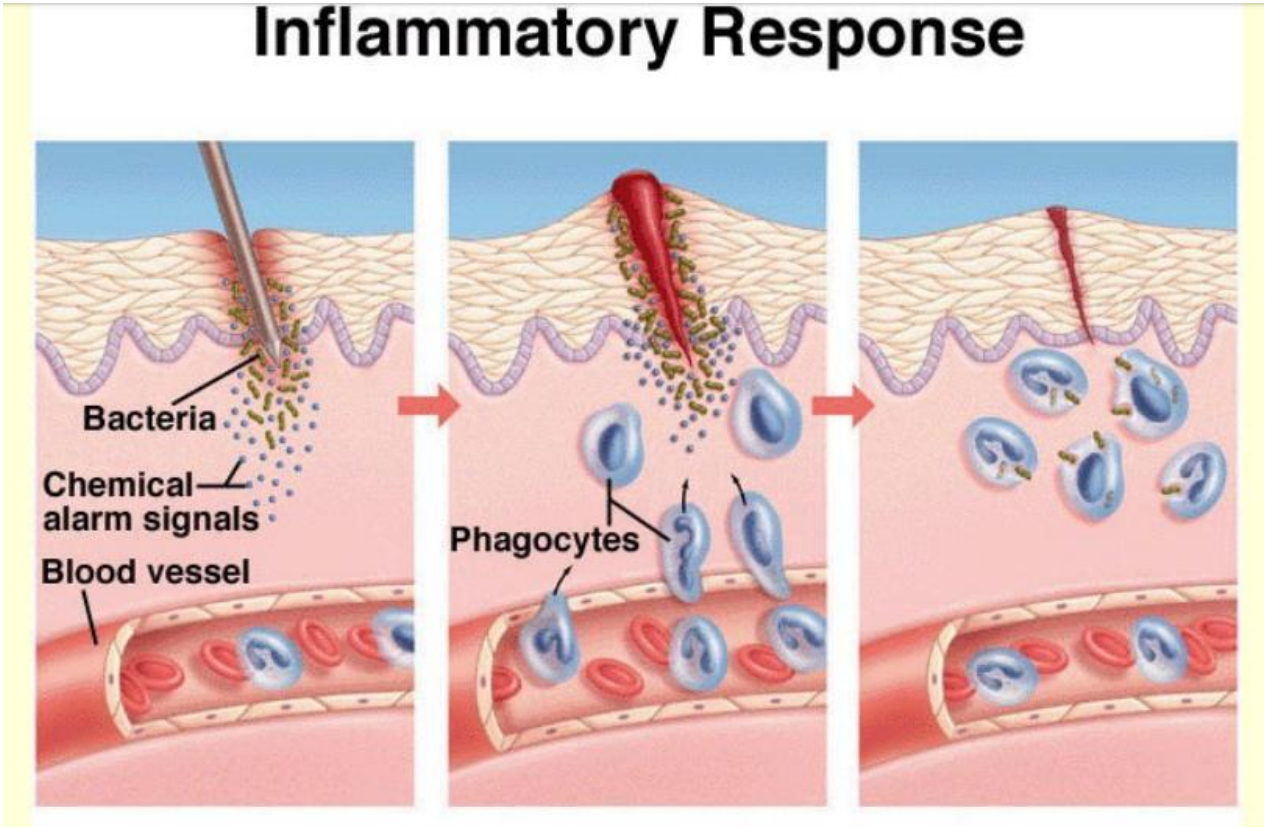




Inflammation

When body tissues are injured or damaged, a series of events called the inflammatory response occurs

- Redness: caused by increased blood flow to the damaged area
- Heat: increased blood flow elevates the temperature in the area of injury, increasing metabolic rate of the body cells
- Swelling: histamine makes capillaries more permeable than usual
- Pain: causes person to protect the area and prevent additional injury



Fever

- A fever is an abnormally high body temperature caused by pyrogens (chemicals that set the “thermostat” in the brain to a higher set point)

- A mild or moderate fever helps the body fight bacterial infections by slowing the growth of bacteria and stimulating body defense responses