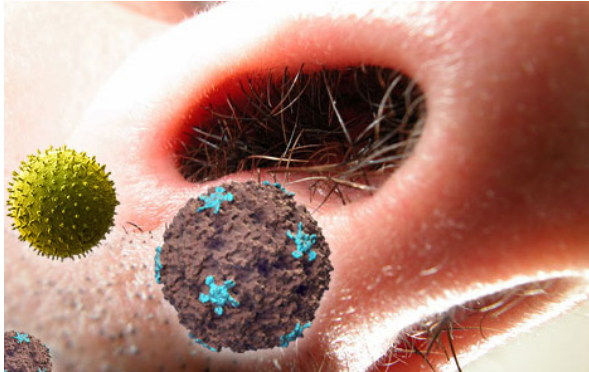


CONCEPT: INNATE IMMUNITY

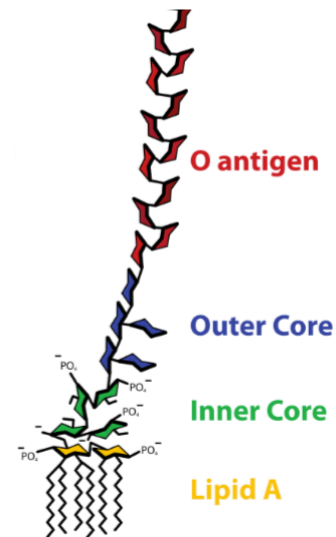
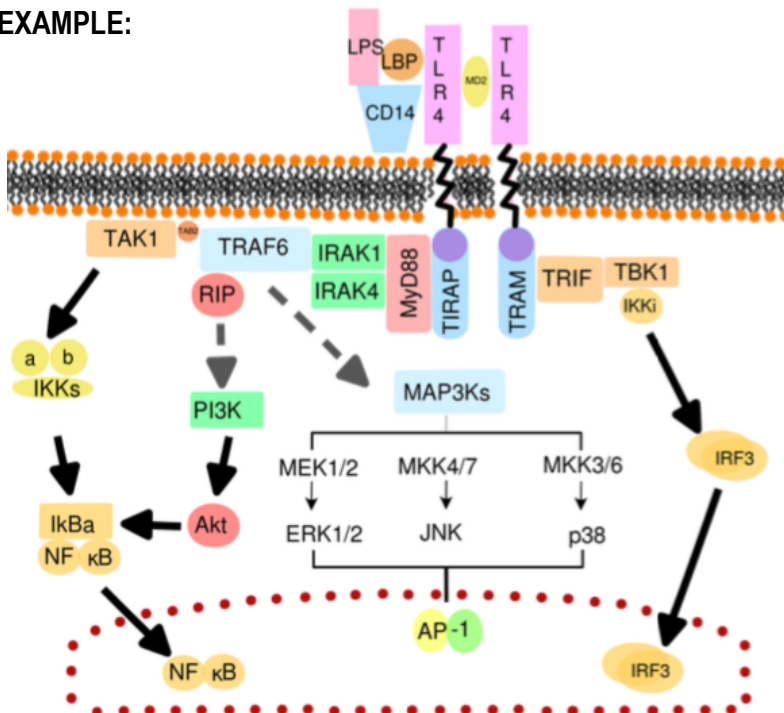
- **Innate immune system** – nonspecific mechanisms that defend against pathogens
 - Skin provides barrier protecting the inside of the body
 - **Mucus** – slimy secretion that traps foreign invaders, contains antimicrobial enzymes
 - **Lysozymes** – enzymes that break down bacterial cell walls

EXAMPLE:



- **Innate immune response** – first response to invading pathogens, initiated by leukocytes
- **Pathogen-associated molecular patterns (PAMPs)** – molecules commonly displayed by pathogens, not by human cells
- **Pattern-recognition receptors (PRR)** – membrane receptors on immune cells that identify PAMPs
 - **Toll-like receptors (TLRs)** – type of PRR found on some immune cells that initiate a signaling cascade
 - TLR4 – recognizes lipopolysaccharides from bacteria, leads to the release of cytokines
 - **Cytokines** – signaling molecules that attract immune cells

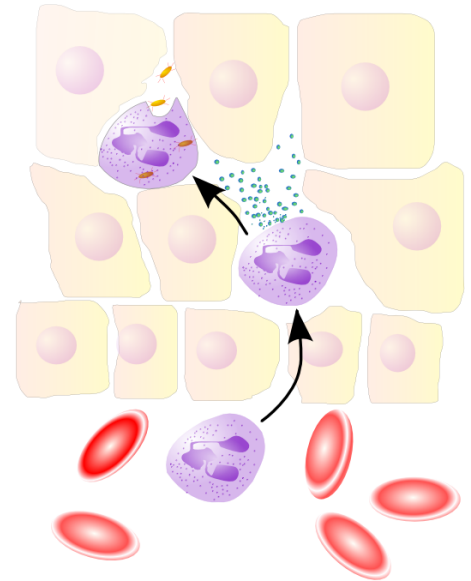
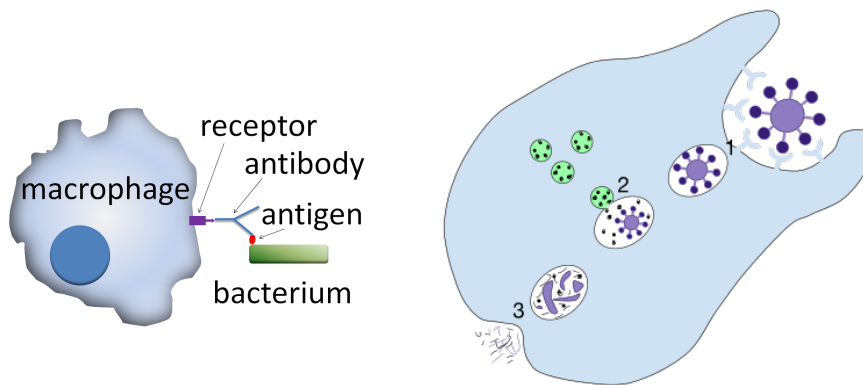
EXAMPLE:



CONCEPT: INNATE IMMUNITY

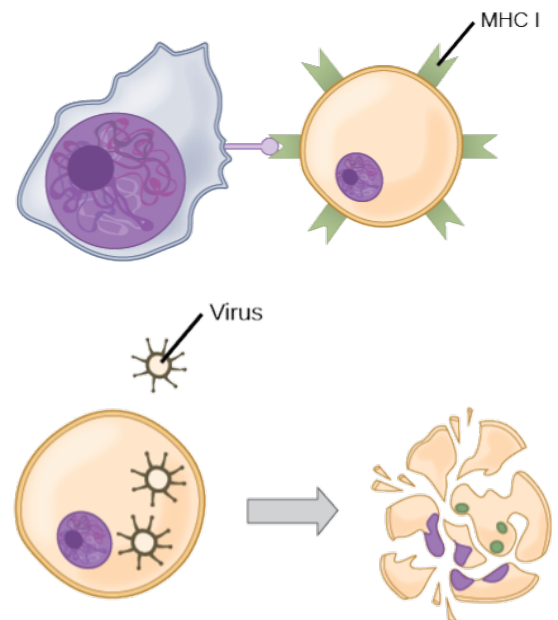
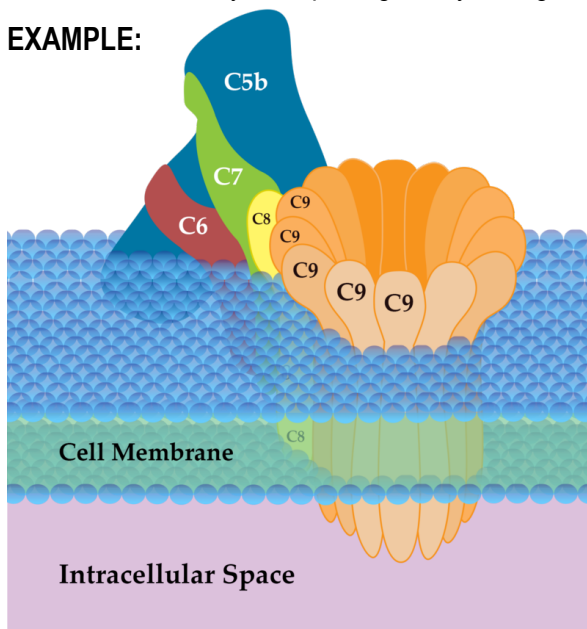
- Phagocytosis of pathogens is triggered after detection by immune system
 - **Neutrophils** – phagocytes that circulate in the blood and are attracted to infected tissues by cytokines
 - **Macrophages** – phagocytes that reside in tissues and organs that frequently encounter pathogens
 - **Dendritic cells** – engulf pathogens to stimulate adaptive immunity
 - Macrophages and dendritic cells are found in and around the lymphatic system, especially lymph nodes

EXAMPLE:



- Eosinophils – defend against multicellular parasites
- **Natural killer cells** – circulate the body to identify and destroy viruses by secreting chemicals to induce apoptosis
- **Interferons** – cytokines that induce cells to interfere with viral replication
- **Complement system** – group of proteins found in blood, activated by PAMPs and antibodies
 - Lead to lysis of pathogens by boring holes in their membranes

EXAMPLE:



CONCEPT: INNATE IMMUNITY

- **Inflammatory response** – type of innate immune response that results in local swelling
 - Following injury, platelets form clots to seal off site and prevent blood loss
 - Wounded tissues and macrophages release chemokines, cytokines that recruit cells to infection site
 - Mast cells release histamine, chemical signal that constricts blood vessels, reducing blood flow and loss
 - Mast cells signal blood vessels peripheral to infection site to dilate
 - Neutrophils, signaled by the blood vessel dilation and chemokines, move to infection site
 - Macrophages are recruited to infection site and release cytokines

EXAMPLE:

