

The Body's Lines of Defence

- The body has three lines of defence to avoid infection
- The first two lines are considered nonspecific immune responses because they do not distinguish one microbe from another
- The third line of defence - the immune system - is a specific immune response that reacts in specialized ways to various invaders

The First Line of Defence

- The first line of defence is mostly physical - consists of the skin and mucous membranes
- Intact skin provides a protective barrier that can not normally be penetrated by bacteria or viruses
- The skin also produces acidic secretions that maintain a pH of 3 to 5, acidic enough to inhibit the growth of microbes
- Lysozyme, an antimicrobial enzyme secreted in human tears, saliva, mucous secretions, and perspiration, destroys the cell walls of bacteria, killing them
- In the respiratory system, foreign debris becomes trapped in a layer of mucus or filtered by cilia, which move in waves sweeping the particles to where coughing can expel them
- The acids in the stomach destroy most invading microbes that enter with food

The Second Line of Defence

- This line of defence can be mobilized if the invader takes up residence
- Leukocytes or white blood cells, are large opaque blood cells that may engulf invading microbes or produce antibodies
- Unlike RBCs, WBCs contain a nucleus, the shape and size of which is used to identify the type of WBC
- One class of leukocytes, called granulocytes, contain cytoplasmic granules and are produced in the bone marrow
- Agranulocytes are also produced in the bone marrow but are modified in the lymph nodes
- When a foreign particle penetrates the skin through an injury, special leukocytes, called monocytes migrate from the blood into the tissues where they develop into macrophages, which use phagocytosis to ingest any invading microbes
- Other WBCs called neutrophils are attracted to chemical signals given off by cells that have been damaged by microbes
- The neutrophils leave the blood via capillaries and migrate towards infected tissue
- They engulf the microbe and release enzymes that digests itself along with the microbe
- The remaining fragments of protein are called pus
- Tissue damage due to physical injury initiates a localized inflammatory response - a nonspecific immune response resulting in swelling, redness, heat, and pain (see Fig.3, p.463)
- For a system-wide defence to more severe damage or infection, injured cells emit chemicals that stimulate the production of phagocytic WBCs and increase their release into the blood stream

- A fever is another system-wide response
- When infectious organisms spread throughout your body (ex/ cold or flu) neutrophils and macrophages digest the invaders and release chemicals into your blood stream
- When these chemicals reach your hypothalamus, they reset the body's thermostat to a higher temperature, making it harder for harmful bacteria to survive and reproduce
- Taking a fever-reducing medication, like Aspirin or Tylenol can actually prolong infection
- Normal body temp is around 37°C , a low grade fever hovers around 40°C
- Fever above 41°C should be reduced with medication, especially in children
- Human cells cannot survive about 43°C

Homework

p.465 #1-7