

Immune system notes

1) Nonspecific Barriers (1st line of defense)

- a. Skin
 - i. Oily
 - ii. Acidic (pH 3-5)
 - iii. Covered in antimicrobial proteins
 1. lysozyme- breaks down bacterial cell walls
 2. contained in saliva, tears and other bodily secretions
- b. Mucous
- c. Cilia in the lungs sweep out invaders
- d. Gastric juices in stomach (HCl)
- e. Symbiotic bacteria can out compete other organisms that cause damage

2) Nonspecific Defenses (2nd line of defense)

- a. Phagocytes (WBC) that engulf pathogens by phagocytosis
 - i. Neutrophils
 - ii. Monocytes – enlarge into large phagocytic cells called macrophages
 - iii. Eosinophils
- b. Natural killer cells (NK cells) WBC that mature in lymph tissue
 - i. Kill pathogen-infected body cells or abdominal body cells (tumors)
- c. Complement
 - i. Group of 20 proteins that “complement” defense reactions.
 - ii. Attract phagocytes to foreign cells and help destroy by promoting lysis
- d. Interferons
 - i. Secreted by cells invaded by the viruses
 - ii. Stimulate neighboring cells to produce proteins that help defend against viruses
 - iii. Certain interferons amplify activity of macrophages and NKs.
- e. Inflammatory response
 - i. Occur in response to pathogens
 1. Chemical alarm in injured area.
 - a. Chemicals are released that initiate defensive actions and sound an alarm to other defense mechanisms.
 - i. Histamine- secreted by basophils
 - ii. Kinins
 - iii. Prostaglandins
 - iv. Complement
 2. Vasodilation (causes vascular permeability)
 - a. Stimulated by histamine
 - b. Increases blood supply to infected area (edema)
 - i. pain (pressure on nerve endings)
 1. also caused by bacterial toxins, kinins and prostaglandins.
 2. ASPIRIN (inhibits prod. of prostaglandins)
 - c. Causes redness and increase in local temp.
 - i. Increase in temp. stimulates WBC and kills some pathogens
 - d. WBC move more quickly through blood vessel walls into injured area

- e. Phagocytes engulf pathogens and damaged cells.
 - i. Find site of injury by chemotaxis
 - 1. mvmt. of cells in response to chemical gradient
 - 3. Complement helps phagocytes engulf foreign cells, stimulates basophils to release histamine, and helps lyse foreign cells.
 - ii. FEVER
 - 1. increases cellular metabolism (accelerates cellular repair)
 - 2. amplifies effect of alarm chemicals
 - 3. creates hostile environment for bacteria
 - 4. CAN break down enzymes if too high→death
- 3) Immune System (3rd line of defense)
 - a. Targets specific antigens
 - i. Any molecule that can be recognized as “non-self”
 - ii. Can be a toxin (like a bee sting), protein coat of a virus or molecules of plasma membranes from foreign cells.
 - iii. When antigen is recognized, a process starts that targets that specific antigen.
 - 1. Recognition
 - a. Antigen recognized as non-self
 - b. MHCs used as identification
 - i. Unique molecules found on the plasma membrane of cells
 - 2. Lymphocyte selection
 - a. Immune system
 - 3. Lymphocyte activation
 - 4. Destruction of foreign substance
 - 5. Memorization