

Chapter 9

1. Terms to know:

- a. Basophil (like mast cells)- blue/purple on a slide due to the histamine it releases (vasoactive- it acts on vessels)
- b. Eosinophil- red/orange, function?
- c. Neutrophils- most abundant WBC, the “first responders”- phagocytes: swallow debris
- d. Macrophages- “2nd responders,” they call over monocytes to enter tissue and differentiate to macrophages
- e. Megakaryocytes- immature form of a thrombocyte
- f. Plasma- secretes antibodies derived from B cell (mature form)

2. Blood Cells

- a. Myeloid- all long bones (sternum, humerus, femur)- bone marrow
 - i. Pluripotent- create stem cells to become whatever they want
- b. Platelets- initiate blood clotting- from plasma/serum WBC's- from thrombocytes
- c. Lymphoid-
 - i. B cells- differentiate between plasma and memory cells
 - ii. T cells-
 - iii. NK cells-
- d. Hemopoietic- formation of blood or blood cells
- e. Dendritic- present antigen

3. Types of Immunity

- a. Innate (natural) born with it
 - i. First line of defense
 - ii. No previous exposure to agent required, no immunological memory
 - iii. Nonspecific response: physical and chemical mechanical barriers, antigen-independent (reacts the same to each antigen)
- b. Adaptive (acquired) remembers and reacts faster for the second exposure
 - i. Specific response
 - ii. Immunological memory

4. Adaptive Immunity

- a. More evolved than innate immunity
- b. Immune response to specific molecules
- c. Develop immunological memory
- d. Response enhances upon repeated exposure of the same agent

5. Innate Immunity

- a. Cilia- moves any foreign substance (nose, bronchials)

- b. Trachea- moves up to expel through coughing
- c. Mucous- sticky with cilia, traps and moves out of the body, pH is neutral to basic
- d. Acid pH- stomach and urogenital, corrodes bacteria, “bacteriocidal”

6. Innate Immunity

- a. Physical and Chemical barriers
 - i. Intact skin
 - ii. Low pH: bacteriocidal
 - iii. Normal skin flora: prevent colonization by pathogens
 - 1. Loss of normal flora allows resistant organisms and fungi to proliferate
 - 2. Normal skin flora- the good bacteria works and competes for space over bad bacteria. Antibiotics get rid of ALL bacteria- including the good bacteria. This is why it is a good idea to take probiotics or eat yogurt while taking antibiotics because it replaces the good bacteria back in your body

7. Innate Immunity

- a. Mucous membranes
 - i. Respiratory, gastrointestinal and urogenital tracts
 - ii. Ciliated epithelial cells: trap and sweep away airborne particles and organisms
 - iii. Goblet cells: produce mucus and secrete mucous cells
- b. Natural secretions
 - i. Chemical barriers: enzymes in secretions inhibit invasion by organisms
 - ii. Tears, saliva, mucus, fatty acids, bile acids
- c. Plasma proteins
 - i. Antimicrobial/antiviral
 - ii. Acute phase reactants
 - iii. Complement cascades and components
 - iv. TNF (tumor necrosis factor), IFN (interferon), opsonins (proteins that coat foreign substances and attract WBC to foreign substances and degrade them (chemotaxis movement))
 - v. Complement- tiny immune proteins start off as C1 and stimulate because of foreign substances and activate C2, etc.
 - vi. Cascade to know:

1. C7		Membrane
2. C8	→ form →	Attack
3. C9		Complex

8. Innate Defenses and Inflammation

- a. Three purposes of inflammatory response
 - i. Neutralize and destroy invading and harmful agents
 - ii. Limit spread of harmful agents to other tissues
 - iii. Prepare damaged tissue for repair
- b. Cardinal Signs of Inflammation **KNOW ALL CARDINAL SIGNS (IN ENGLISH AND LATIN FORMS)**
 - i. Rubor (red), dolor (pain), calor (heat), tumor (swelling), functio laesa (loss of function)
 - ii. Acts on normal tissue to diffuse all over
 - iii. Inflammation= all tissues affected are damaged
 - iv. Auto-immune

9. Inflammation

- a. Phases of the inflammatory response
 - i. Increased blood flow to site
 - ii. Increased vascular permeability
 - iii. Leukocyte recruitment and emigration
 - iv. Phagocytosis
 - v. Chemokines- attract more neutrophils
 - 1. More macrophages, the more histamine vasodilates vessels
 - a. More blood, heat, and redness makes the vessels more permeable which allows fluids to enter the injury site and swell

10. Inflammation

- a. Causes of inflammation:
 - i. Endogenous- inside tissues
 - 1. Tissue ischemia
 - ii. Exogenous- outside tissues (chemical agents)
 - 1. Physical agents: burns, radiation
 - 2. Chemical agents: acids, corrosives
 - 3. Microbial: most common, gram negative bacteria endotoxins/LPS, exotoxins
- b. Inflammation can benefit or harm host

11. Types of Inflammation

- a. Acute
 - i. Short duration: less than 2 weeks
 - ii. Discrete set of events (how it started, how it looked)