- Venules

-Know the factors that affect physiology of circulation

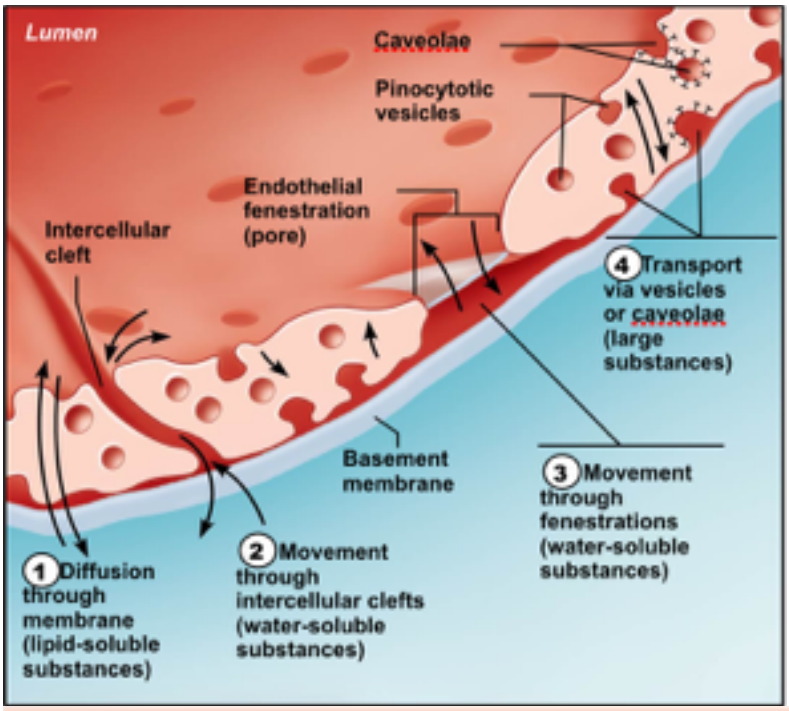
- Blood flow: volume of blood flowing through vessel, organ, or entire circulation in given period
  - Measured in ml/min
- Blood pressure (BP): force per unit area exerted on wall of blood vessel by blood
  - Expressed in mm Hg
- Resistance (peripheral resistance): opposition to flow
  1. Blood viscosity
     - Increased viscosity equals increased resistance
  2. Total blood vessel length
     - The longer the vessel, the greater the resistance encountered
  3. Blood vessel diameter
     - Has greatest influence on resistance
     - If radius increases, resistance decreases, and vice-versa

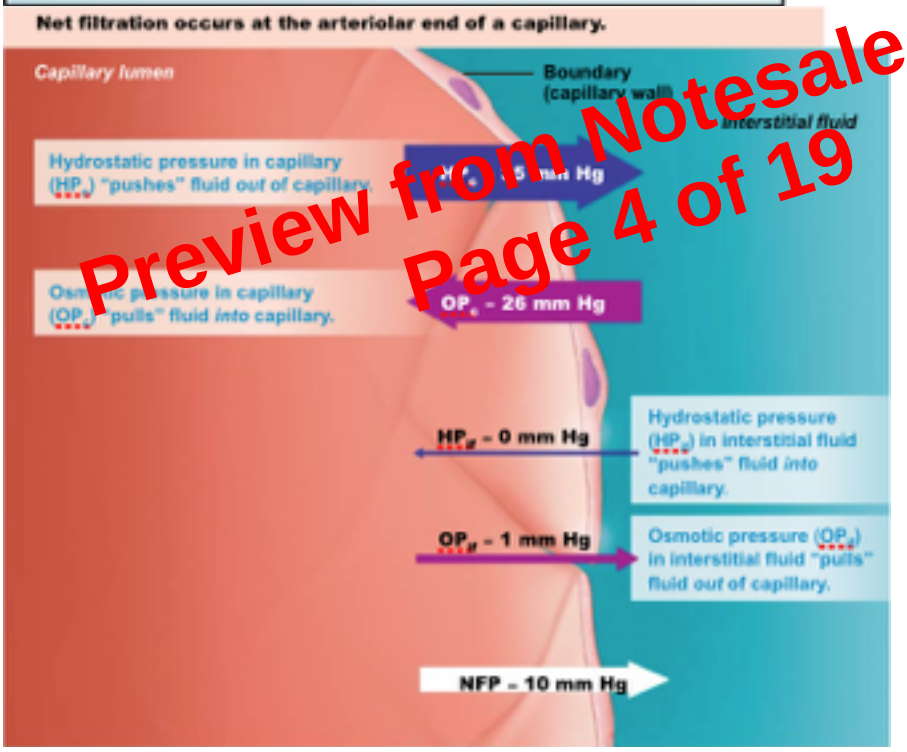
-Relationship of flow, pressure and resistance

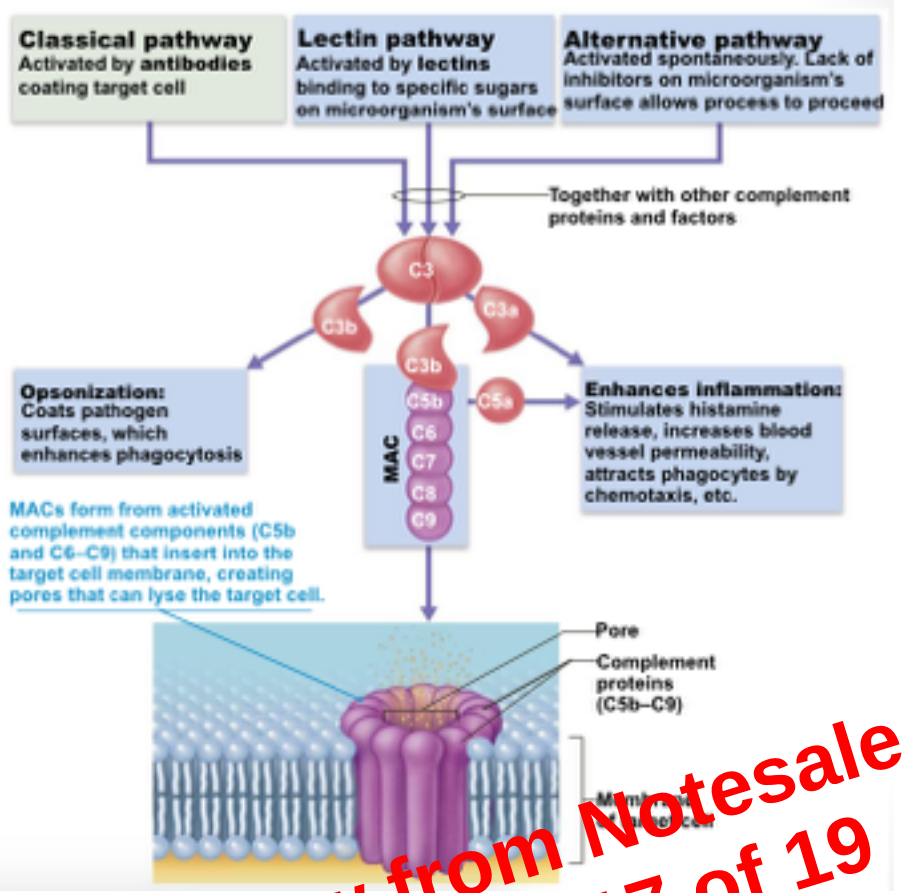
- Blood flow (F) is directly proportional to blood pressure gradient (ΔP)
  - If ΔP increases, blood flow speeds up
- Blood flow is inversely proportional to peripheral resistance (R)
  - If R increases, blood flow decreases, so
    - $F = \Delta P/R$
- R is more important in influencing local blood flow because it is easily changed by altering blood vessel diameter

-Mean arterial pressure

- Varies with cardiac cycle
  - Systolic blood pressure (SP) = maximum pressure
    - Due to ejection of blood into aorta
  - Diastolic blood pressure (DP) = minimum pressure
    - Not zero due to elastic recoil
  - The measured BP is shown as SP/DP
    - Example: 110 / 70
  - Pulse pressure (PP) is SP – DP
    - Example: 100 – 70 = 30
  - Mean Arterial Pressure (MAP) = DP + (PP/ 3)
    - Example: 70 + (30 / 3) = 80 mm Hg







- Fever: Abnormally high body temperature that is systemic response to invading microorganisms
  - Leukocytes and macrophages exposed to foreign substances secrete pyrogens
  - Pyrogens act on body's thermostat in hypothalamus, raising body temperature

-Be familiar with the types of adaptive immune responses

- Humoral immunity
  - Antibodies, produced by lymphocytes, circulate freely in body fluids
  - Humoral immunity has extracellular targets
- Cellular Immunity
  - Lymphocytes act against target cell
  - Cellular immunity has cellular targets
- Antigens: substances that can mobilize adaptive defenses and provoke an immune response
- Characteristics of antigens
  - Can be a complete antigen or hapten (incomplete)
    - Complete antigen - foreign proteins, polysaccharides, lipids, and nucleic acids
    - Hapten: binds to body's own proteins and together gets recognized as foreign substance
  - Contain antigenic determinants: parts of antigen that antibodies or lymphocyte receptors bind to