

# The Human Body Systems

## I. Chapter 21 – The Immune System

- A. Infectious Disease are caused by a **pathogen** – an organism or virus that causes a disease.
1. Disease occurs when a pathogen has invaded the body and causes harm to individual cells
  2. Examples include: **measles, mumps, pneumonia, chicken pox, HIV & AIDS**, etc.
  3. Pathogens include various types of **Bacteria, Viruses, Fungi & Protists**
    - a) **Bacteria** – cause food poisoning, botulism, ear infections, tuberculosis, strep throat, etc.
      - (1) Cause damage, hence disease, by invading and kills/damaging cells themselves or
      - (2) Produce waste products called toxins that poison – botulism
    - b) **Viruses** – cause disease by killing/damaging invaded cells – colds ( over 200 types) and flu, chicken pox and AIDS
    - c) **Fungi** – molds, yeast, etc cause athlete's foot, ringworm, yeast infections
    - d) **Protists** – cause gastronomic distress – Giardia sp. and malaria
- B. The Body's Defenses
1. 1<sup>st</sup> Line of Defense: Barriers keep pathogens out.
    - a) **Skin** – waterproof barrier w/ destructive oils and sweat to help killoff pathogen
    - b) **Breathing Passages** – nasal passages, trachea, bronchi and lungs lined w/ ciliated epithelial cells that secrete mucus and moved “captured” pathogens up & out of the respiratory tract to be expelled or swallowed!
    - c) **Mouth & Stomach** – Saliva and stomach acids aid in killing off pathogens
  2. 2<sup>nd</sup> Line of Defense: Once infected.... Then what? The **inflammatory response**
    - a) Damaged cells trigger the body's **inflammatory response**
      - (1) Blood vessels dilate (widen & enlarge) causing increased blood flow and leak plasma and white blood cells into the area – causes swelling, redness, tenderness and fever.
  3. 3<sup>rd</sup> Line of Defense: The Immune Response
    - a) **White Blood Cells – WBC – Several Types**
      - (1) **Phagocytes** – Attack, engulf pathogens and destroys them
        - (a) **phils – latin suffix meaning “love”**
          - (i) **Basophils** – least abundant WBC “loves” base type stains –
          - (ii) Eosinophils – “loves” eosin type stains
          - (iii) Neutrophil – Most abundant WBC – loves neutral stains
        - (2) **Lymphocytes (T cells and B cells)** produce antibodies
      - b) **Antibodies** are proteins that react with antigens (foreign molecules that have attacked the body) to deactivate them.
        - (1) **T Cells** – Identify one kind of pathogen from another –
          - (a) Over 10 million T Cells in your body, each able to recognize different types of proteins (**Antigens**) found on the cell membrane of the pathogen. T Cells are able to identify the antigens as from your own body or are foreign
            - (i) Some T Cells attack and kill our own infected cells and invading viruses
            - (ii) Other T Cells stimulate B Cells to kick into action
          - (2) B Cells – Once activated, they produce **antibodies** that are specific to the infected type of antigen (about 2,000 antibodies per second!!!)

(3) Antibodies – attach to the proteins (antigens) of the pathogens and they form clumps of pathogens that mark them for destruction by the phagocytes