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. 1st 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, bonchi 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. 2nd 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. 3rd 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 forgein

(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