IMMUNOLOGY

- **Immunology**- study of our protection against macromolecules and foreign bodies and our response to them

- **Pathogens**-any disease causing organism
  - Viruses & bacteria
  - Protozoans and larger parasites

- **Skin** = 1st line of defense
  - Secretions such as tears and saliva also aid in defense
  - Non-specific

- What happens when invaders get past our primary defense?
  - 2nd line of defense is activated
  - Our body has multiple means of defense

- **Innate Immune Response**

  1. *Inflammation*- chemicals released by injured skin trigger phagocytes (white blood cells)
  2. *Phagocytosis*- macrophages and neutrophils (wbc) react to invaders by surrounding and engulfing them

- **Adaptive Immune Response**

  1. *Antigen*- A substance that initiates an immune response and ultimately reacts with the specific products made from an immune response

- Antigens which induce the adaptive immunity are *Immunogens*

2. *Antibodies*- Soluble proteins that bind to specific antigens and help destroy the pathogen

3. *Lymphocytes*- special type of white blood cell with subgroups

a. **T cells**
- attack antigens directly
- mature in thymus gland
- specific to one type of antigen
- some turn into memory cells
- Helper T cells & Suppressor T cells

b. **B cells**
- Produce antibodies to attach to the antigens for later destruction
- Mature in bone marrow
- Specific to one type of antigen
- Some turn into memory cells

4. *Natural Killer Cells*- ability to destroy foreign invader without prior expose to antigen (neither T or B cells)

- **Cell Immune Response**- cell mediated response to invader (no antibodies)
  - T cells directly attack the invader and destroy them

- Helper T cells activate macrophages and NK cells, as well as releasing cytokines that activate B cells
- Suppressor T cells can turn off B & T cells once infection is under control

- **Humoral Immune Response**- antibody mediated response to invader
    - Macrophage engulfs invader and displays digested material on outside of macrophage
    - Helper T cells bind to these pieces (antigens) and activate B cells to secrete antibodies
    - Antibodies bind to the invader and flag them for destruction
- **Types of Antigens**

1. *T independent*- directly stimulate B cells to produce antibodies without the requirement for T cell help
2. *T dependent*- cannot stimulate B cells to produce antibodies without T cell help

- **Antibody Formation**

1. Self vs non-self discrimination (normally acts against non-self cells)
2. Memory (ability to remember antigens)
3. Specificity (antibody acts only against specific antigens)

- **Factors influencing immunogenicity**

1. Foreignness
2. Size

3. Chemical composition
4. Physical form
5. Degradability

Non-specific immunity	**Specific immunity**
Antigen independent	Antigen dependent
Immediate defense	Lag time in defense
Not antigen specific	Antigen specific
No memory cells produced	Memory cells produced
Some components may help in help in specific immunity	Some components may help in specific immunity