

## The Human Immune System

- The body's defense against disease causing organisms, malfunctioning cells, and foreign particles
- A collections of cells, tissues, and organs that fight disease-causing agents

### Lines of Defense

- First line of Defense – skin
  - Lining of stomach and intestines
  - Lining of nose eyes and ears
  - Secretations
- The dead, outer layer of skin, known as the **epidermis**, forms a shield against invaders and secretes chemicals that kill potential invaders

<b>White Blood Cells</b>	<b>Blood cells that protect the body against pathogens (bacteria/virus)</b>
<b>Phagocytes</b>	A cell that ingests (eats) and destroys bacteria and other foreign particles
<b>Interferon</b>	Play a role in the 1 <sup>st</sup> line of defense It that helps to stop virus from reproducing. Boosts immune system
<b>T-Cells</b>	Type of white blood cell. “Soldiers” Adapts to pathogens and destroys them
<b>Inflammatory Response</b>	Defense reaction of the body to invasion by a foreign substance/organism; involves WBC, pus, increase in temp.

- You shed between 40 – 50 thousand skin cells every day!
- Destroy pathogens (bacteria, viruses)

### The Second Line of Defense

- The thymus and spleen release WBCs into the blood.
  - The spleen also filters the blood. It recycles the old, run down red blood cells – some parts are reused.
  - White blood cells

- Body temperature

Inflammation- because more blood is flowing to a certain area

### Specific Immunity

- Antigens are molecules that are foreign to your body
- Antibody is a protein that is made in response to a specific antigen
  - Antibody attaches to a specific antigen and makes it useless.
    - Protein made by the body that makes the antigen so that is useless or can be destroyed by a lymphocyte.
- Active your body makes its own antibodies
  - **You** produce the antibodies
  - Your body has been exposed to the antigen in the past either through:
    - Exposure to the actual disease causing antigen – You fought it, you won, you remember it
    - Planned exposure to a form of the antigen that has been killed or weakened – You detected it, eliminated it, and remember it
    - Vaccine
      - Antigen that is injected or taken orally into the body so that the body can build up antibodies to destroy the pathogen.
      - A booster vaccine is to keep your antibody #s up.
      - Example would be a tetanus
- Passive when antibodies are produced in another organism are introduced into your body to help destroy the antigens.
  - You **don't** produce the antibodies
  - A mother will pass immunities on to her baby during pregnancy - through placenta?
  - These antibodies will protect the baby for a short period of time following birth while its immune system develops. What endocrine gland is responsible for this?
  - Lasts until antibodies die
- Protecting against disease
  - Heat (pasteurize)
  - Chemicals

- Radiation
- Water

#### How disease spreads

- By coming in contact with the pathogen
- As you breathe in, foreign particles and bacteria bump into **mucus** throughout your respiratory system and become stuck
- Hair-like structures called **cilia** sweep this mucus into the throat for coughing or swallowing
- Swallowed bacteria are broken down by incredibly strong acids in the stomach that break down your food
- The stomach must produce a coating of special mucus or this acid would eat through the stomach!

#### How does our body keep viruses and bacteria out?

- Examples include:
  - Skin, tears, earwax, saliva, gastric juice, mucus, cilia
  - how might each of these keep out the invaders?
  - What do you think this is?

#### *Escherichia coli* (*E. coli*)

is common and plentiful in all of our digestive tracts. Why are we all not sick?

- Immune Disorders
  - ~Allergies~
    - Immune system mistakenly recognizes harmless foreign particles as serious threats
    - Launches immune response, which causes sneezing, runny nose, and watery eyes
    - Anti-histamines block effect of histamines and bring relief to allergy sufferers
- **Aquired Immune Deficiency Syndrome**
  - Caused by the Human Immunodeficiency Virus
  - Discovered in 1983
  - Specifically targets and kills T-cells
  - Because normal body cells are unaffected, immune response is not launched
  - The HIV virus doesn't kill you – it cripples your immune system
  - With your immune system shut down, common diseases that your immune system normally could defeat become life-threatening
  - Can show no effects for several months all the way up to 10 years
- Koch's Postulates
  - 1. Microorganisms are isolated from dead animals
  - 2. Microorganisms are grown in pure culture
  - 2b. Microorganisms are identified

- 3. Microorganisms are injected into healthy animals
- 4. Disease is reproduced in second animal
- 5. Microorganisms are grown in pure culture
- 5b. Identification of identical microorganism.

