

Immune System:

Purposes and Functions of the Immune System:

- Fight against pathogens (a.k.a. your army)
- Recognize antigens (specific protein markers on foreign cells)
- Can engulf or mark invaders for destruction
- Create antibodies and memory cells

Functions of white blood cells:

1. Transport oxygen and carbon dioxide
 2. Destroy bacteria by phagocytosis
 3. Turn off allergic responses and kill parasites
 4. Release histamine and other mediators of inflammation
 5. Mount immune response by direct cell attack or via antibodies
 6. Develop into macrophages in tissues
- macrophages/phagocytes: engulf pathogens
 - Lymphocytes: recognize antigens
 - T-cells: kill pathogens or mark them for destruction (killer/helper/memory)
 - B-cells: produce specific antibodies (plasma cell/membrane)

Protection against diseases:

- The first line of defense: keep them out
- Skin, secretions (tears, saliva, hairs, mucus)
- May get in (cuts, mouth, nostrils)
- The second line of defense: inflammatory response
- Macrophages come to the area
- Body temperature increase: fever
- The third line of defense: pathogen has reached your body cells
- Lymphocytes and antibodies created

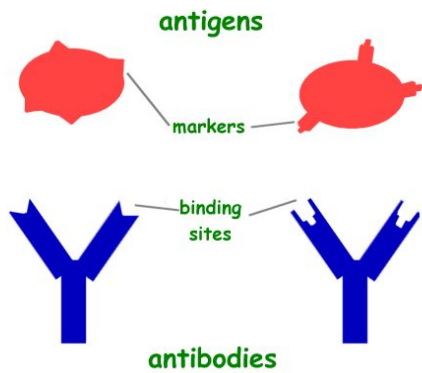
Stages (antibody-mediated immunity)

- 1) Antigen detection
- 2) Activation, or helper T-cells
- 3) Antibody production by B-cells

Antibody:

- A protein that helps destroy pathogens
- Specific to the antigen

- Antibody-antigen “perfect fit”
- Clump pathogens together → phagocytes engulf



Antibiotics - for bacterial and fungal infections

- Medications that destroy or slow down the growth of bacteria

Vaccine - for viruses (and some bacteria)

- Dead or weakened form of the virus/bacteria
- Produces immunity to a disease by stimulating the production of antibodies

Problems in the Immune System:

- Allergic reactions: response to antigens on allergins (mistaken as harmful)
- Autoimmune diseases: immune system targets own cell proteins
- Transplants: a person may reject new organ (“foreign antigens” to the body -- immune attack)
- damage/weakened immune system: HIV (virus) → AIDS (disease)

HIV-AIDS

- HIV attacks own immune system
- Invades and destroys helper T-cells
- Can’t make antibodies properly or eliminate cells containing HIV
- Decrease body’s ability to fight infection constant helper T-cell being infected & destroyed → AIDS

Prevention of Disease:

- Good hygiene/health
- Vaccines
- Avoid sharing of needles (blood)
- Avoid transfer of bodily fluids from sexual contact

| Antibiotics | Vaccines |
|-------------------------------------|-----------------|
| For bacterial and fungal infections | For viruses |

| | |
|---|---|
| A medication that slows down or destroys the growth of bacteria | A dead or weakened form of the virus Produces immunity to diseases by stimulating the production of antibodies |
| Form of treatment | Form of prevention |

They are both a way to fight illness caused by pathogens

Infectious v.s non-infectious diseases

Infectious:

- Caused by pathogens

Non-infectious:

- Inheritance, toxic substances, organ failure
- They can't be prevented

Diseases not caused by pathogens:

- Anxiety, cerebral palsy, breast cancer, depression, scoliosis, OCD, diabetes

| | |
|-----------------|------------------|
| Egestion | Excretion |
| Solid waste | Cellular waste |
| nutrition | liquid/gas |

Excretory system:

Over view:

- Wastes of metabolism are removed from the body
- Carbon dioxide and water nitrogenous wastes (ex: urea)
- Pass from cells →blood →excretory organs →out of body
- Urin = urea, salt, water

Excretory organs

- Lungs, kidneys, liver, urinary system, sweat glands

Lungs:

- The excretion of oxygen and water vapor
- Wastes of cellular respiration
- Waste is diffused out of the alveoli

Liver:

- Deamination, the process by which the amino group is removed from amino acids
- Gets rid of excess amino acids are converted into urea, excreted by the breakdown of red blood cells
- Deamination: the removal of the NH₂ part of the amino acid molecule

Sweat glands:

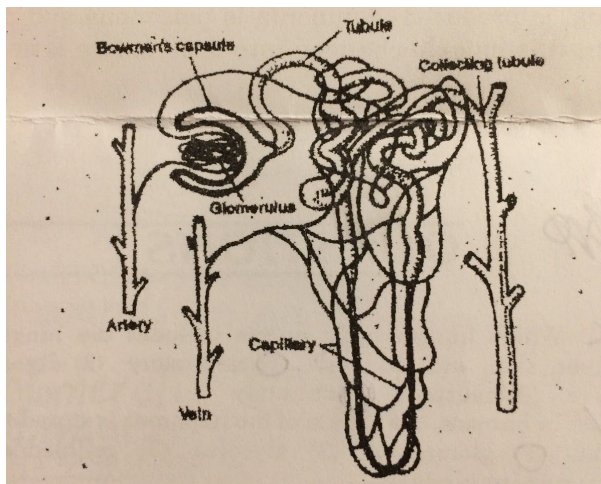
- Excretes wastes, including water, salts, and small amounts of urea
- The wastes pass through by diffusion from capillaries to sweat glands, to ducts and pores

Kidneys:

- Remove urea from the blood
- Regulate concentrations of bodily fluids
- Blood is carried to the kidneys by a large artery
- **Filtration:** when things filter through the Bowman's capsule
- **Glomeruli:** the artery subdivides many times to create balls of capillaries called glomeruli
- **Nephron:** the functional part of a kidney. 1 million in each kidney. Consists of a glomerulus surrounded by a cup-shaped thing called Bowman's capsule
- **Bowman's capsule:** amino acids, water, salts, urea, and glucose filter out of it

Urinary system (kidneys, ureters, urinary bladder, urethra):

- Urine flows from each kidney to a large tubule called the ureter. They carry urine to the urinary bladder, a muscular organ in which urine is stored temporarily.
- Urethra - urine is periodically expelled from the bladder into the tube (urethra) leads to outside the body.



Diseases of the excretory system

- Gout: produces symptoms of severe pain in the joints, similar to arthritis
- Bladder cancer: the growth of malignant cells within the urinary bladder
- Kidney stones: formed by the accumulation of calcium or uric acid crystals within the kidneys.