

The Body

Anatomy - the study of structure.

Physiology - the study of function.

Planes

Section - the cutting of the body or a part to make internal structures visible.

Frontal (coronal) -

Sagittal -

Transverse -

Cross-section -

Longitudinal -

Cranial caudal

Superior inferior

Dorsal ventral

Medial lateral

Proximal distal

Anterior posterior

midsagittal

Dorsal cavity - consists of the cranial and spinal cavities; lined with meninges.

Ventral cavity - consists of the thoracic, abdominal, and pelvic cavities.

Thoracic - lined with the parietal pleura; visceral pleura covers the lungs.

Abdominal - lined with the peritoneum; mesentery covers the abdominal organs.

Pelvic - inferior to the abdominal cavity.

Skin

- Functions to cover surfaces of the body
- Protects underlying cell layers from bacteria, heat, and chemicals

Bones-diaphysis

- Functions to support the body and blood production in marrow
- Adults have 206 bones
 - Ligaments attach bone to bone
 - Cartilage is a flexible connective tissue found between bones

Axial skeleton: protects soft organs and tissues

- Skull
- Ribs
- Breastbone
- Vertebrae

Appendicular skeleton: adapted to allow the body to move

- Arms, legs, hands, feet

Bone Structure: made of 2 types of living tissue

- Compact bone

- Spongy bone
 - Holds and protects red or yellow bone marrow
 - Red bone marrow produces blood cells. Young people have mostly red bone marrow.
 - Yellow marrow is mostly fat. It can change back to red marrow and produce blood cells if the body suddenly loses blood
- Bone Growth: bones form when cells called osteoblasts secrete chemicals that cause cartilage to harden.
 - Calcification: the process of creating hard bone by combining collagen and calcium phosphate
 - Bones grow from the ends where cartilage is located

Joints: where 2 or more bones meet

- Ball and Socket: allow movement in all directions
Ex: hips and shoulders
- Pivot Joints: allow bones to twist around each other
Ex: twisting your lower arm
- Hinge Joints: allow back and forth motion
Ex: elbows and knees
- Gliding: allow the flat surfaces of bones to slide over each other
Ex: wrist and ankle
- Saddle Joint: allow a bone to move front to back and left to right
Ex: thumb

Muscles

- Allows for the movement of the body
- Tendons attach muscle to bone

Muscle structure

- Muscle fibers are made of myofibrils (long strands of protein causing muscle contractions)
- Myofibrils are made of sarcomeres
- Actin filaments are thin protein fibers that are pulled to cause muscle contraction
- Myosin filaments are protein fibers that pull actin
- During contraction, myosin pulls the actin toward the center to shorten the sarcomere
- During relaxation, actin filaments are far away from the center of the sarcomere

3 Types of Muscles

1. Smooth: found in internal organs, contracting to move materials through the body
 - involuntary
2. Cardiac: makes up the heart

- involuntary
3. Skeletal: attached to bones and contracts to produce body movements
- Voluntary

Sliding filament

Digestive System

- Begins in the mouth with both chemical and mechanical action
- Chemical and mechanical digestion continues in the acidic environment of the stomach
- Digestion is completed in the small intestine and food is absorbed
- Large intestine absorbs water before indigestible materials are eliminated

5 Senses

1. Sight
2. Sound
3. Smell
4. Taste
5. Touch

Respiratory System

The respiratory system moves air into and out of the lungs. The lungs are the site of exchange of O_2 and CO_2 .

The functioning of the respiratory system depends directly on the proper functioning of the circulatory system.

Nose and nasal cavities

Pharynx - posterior to the nasal and oral cavities

Larynx - the voice box, and the airway between the pharynx and trachea

Trachea - the airway from the larynx to the primary bronchi

Bronchial tree - from the trachea to the alveoli.

- Primary bronchi
- Secondary bronchi
- Bronchioles

Alveoli - the sites of gas exchange

Elastic connective tissue is between the alveoli

Ventilation - the movement of air into and out of the lungs

Ventilation takes place because of pressure changes

- Made of a pair of lungs and a series of passageways, each one extending deeper into the body
 - Trachea (windpipe): tubelike passageway that leads to 2 tubes or bronchi
 - Bronchi: tubes that lead to the lungs
 - Alveoli: sacs in the lungs where oxygen and carbon dioxide are exchanged
 - The respiratory and circulatory systems work together to maintain homeostasis

Circulatory System

- Blood is made of red and white blood cells, platelets, and plasma.

- Blood carries oxygen, carbon dioxide, and wastes through the body.
 - Blood is carried by arteries, veins, and capillaries
 - Blood is pushed through the vessels by the heart
 - Right and left atria
 - upper chambers
 - Interatrial septum
 - Right and left ventricles
 - lower chambers
 - Interventricular septum
 - Right atrium: Receives blood from:
 - Superior vena cava
 - Inferior vena cava
 - Right ventricle: Pumps blood into the pulmonary artery
 - Papillary muscles and chordae tendineae - anchor the AV valve flaps to the floor of the ventricle.
 - Left atrium: Receives blood from the pulmonary veins
 - Left ventricle: Pumps blood into the aorta
 - The right side receives blood from the body and pumps it to the lungs.
 - The left side of the heart receives blood from the lungs and pumps it to the body
- Heart has 4 chambers
 1. right atrium: receives oxygen poor blood from the body and pumps it to the right ventricle
 2. right ventricle: pumps oxygen poor blood to the lungs
 3. left atrium: receives oxygen rich blood from the lungs and pumps it to the left ventricle
 4. left ventricle: pumps oxygen rich blood to all parts of the body
- The heart pumps blood through 2 main pathways
 1. pulmonary circulation: occurs between the heart and the lungs
 2. systemic circulation: occurs between the heart and the rest of the body
- Red Blood Cells: carry oxygen to the body cells
 - White Blood Cells: protect the body from disease
 - Platelets: help blood clot after injury
 - Plasma: the fluid portion of blood
 - Arteries: pump blood away from the heart
 - Veins: carry blood back to the heart
 - Capillaries: allow nutrients and gases to diffuse between blood cells and surrounding tissue cells

Nervous System

Motor vs. sensory neuron

Parts of NS

Central/peripheral

Nerve impulse

Basic electrochemical signal

Excretory System

Function of the kidneys - to form urine to excrete waste products and to regulate the volume, electrolytes, and pH of the blood and tissue fluid.

The nephron - the functional unit of the kidney

The formation of urine involves three major processes:

Glomerular filtration: takes place from the glomerulus to Bowman's capsule.

Tubular reabsorption: useful materials in the renal filtrate are returned to the blood.

Approximately 99% of the filtrate will be reabsorbed. Most reabsorption takes place in the proximal convoluted tubules.

Tubular secretion: takes place from the blood in the peritubular capillaries to the filtrate in the renal tubules where unwanted materials can be excreted in urine.

Ureters - each extends from the hilus of a kidney to the lower, posterior side of the urinary bladder.

Urine is kept moving toward the bladder by waves of peristalsis

Urinary bladder - a reservoir for temporary storage of urine; below the peritoneum, behind the pubic bones.

Urethra - takes urine from the bladder to the exterior

Nephron

Glomerulus

Structures- ureter urethra