Human Body Systems



Regulation and Homeostasis in the Human Body:

Quick view

Eleven Body Systems work together to maintain homeostasis.

1. Nervous System2. Endocrine System

4. Circulatory System

6. Digestive System

- 3. Lymphatic System
- **5.** Respiratory System
- 7. Excretory System 8. Skeletal System
- 9. Muscular System 10. Integumentary System 11. Reproductive System

Human Body Organization

The Human Body

is composed of



are composed of

Organs

are composed of

Tissues

are composed of

Cells

What is the job of your circulatory system?

 To transport oxygen and nutrients around your body and to help to get rid of wastes



What organs, or parts, make up your circulatory system?

- · Arteries
- · Veins
- · <u>Heart</u>
- · <u>Blood</u>



The heart pumps blood through the body.



HA

Types Of Blood Vessels

Arteries

Connective Smooth muscle tissue

Move blood <u>away</u> from heart
 Have <u>thick & elastic</u> walls, made of <u>smooth muscles</u>.

Are connected to <u>ventricles</u> in the heart.

Types Of Blood Vessels Veins



Move blood <u>toward</u> the heart
Have one-way valves.
Are squeezed by <u>skeletal</u> muscles.
Carry blood with <u>waste materials</u> and that is oxygen-poor.

Types Of Blood Vessels

Capillaries



Are <u>microscopic</u> blood vessels.
Connect <u>arteries</u> to <u>veins</u>.
Their walls are <u>only one cell</u> thick!
<u>Nutrients</u> and <u>oxygen</u> are <u>exchanged</u> from the blood to body cells through capillary walls.





Red blood cell

White blood cell



Parts of Human Blood

White blood cells





Red blood

cells

Platelets

Platelets



<u>Help clot</u> <u>blood</u> Plasma



Digestive System Function:

Digestion is the process of breaking <u>food</u> into small molecules so that they can be absorbed and <u>used</u> by the body.



Nutrients...

 Are substances in food that provide <u>energy</u> and materials for cell development, <u>growth</u>, and <u>repair</u>.



The Digestive System

Function: to change food into simpler molecules that can be absorbed into bloodstream and used by the body

Major Organs : Organs that food will pass through

Mouth

Esophagus

Stomach

Small intestine

Large intestine

The Digestive System

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Your Digestive System

Esophagus: <u>muscular tube</u> that connects throat to stomach. Moves food down by squeezing (<u>peristalsis</u>)





Your Digestive System

Stomach: muscular <u>bag</u> where chemical and mechanical digestion continue; food stays here <u>~4 hours</u>, changes to <u>chyme</u>





Small Intestine:

- Tube nearly <u>7 meters</u> long where digestive juices from <u>liver and pancreas</u> are added
- villi absorb small nutrient molecules.
- All chemical and physical digestion ENDS



The small intestine absorbs nutrients and transfers the nutrients to the circulatory system. The small intestine is lined with small fingerlike projections known as **villi** which designed to have a large surface area for this task.

Villus

Small

Intestine

Large Intestine: <u>absorbs water</u> from undigested food, where unabsorbed materials become <u>more solid</u>



Rectum: where solid wastes (feces) are stored.

ANUS: muscles <u>control</u> the <u>release of</u> <u>solid wastes</u> from the body



Respiratory System

Major Structures

 lungs, nose, mouth, trachea

Functions

 moves air into and out of lungs; controls gas exchange between blood and lungs



The **Respiratory System** links to the **Circulatory System** to provide cells with oxygen and remove carbon dioxide



Gas Exchange in the lungs occurs through the process of DIFFUSION High concentration of oxygen (O_2) moves out of lungs into blood to balance concentration. CO_2 does the opposite (moves from blood to lungs)



The Lungs are only air sacs. In order for them to move they must work together with a muscle known as the Diaphragm



Excretory System

Functions

 Removes cellular wastes from blood and the body

Major Structures

- kidneys
- urinary bladder
- ureters
- urethra
- skin,
- lungs



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Wastes and water diffuse out of the blood into filters in the kidney. The kidneys form the liquid waste URINE. Urine leaves the kidneys and is passed from the ureters to the urinary bladder.



How does the human body move from place to place and have the ability to run, blink or build things?

These things are all made possible by the <u>skeletal</u> and muscular systems.







Muscular System

Function: MOVEMENT Major Muscle Types

- Skeletal Attached to bones for voluntary actions
- Smooth Found in the digestive tract and the blood vessels to move food and blood. Control involuntary actions (you do not decide for them to work)
- Cardiac Heart muscle cells are involuntary.



Skeletal muscles work in opposing pairs. When one muscle contracts, the other relaxes.





Interesting Facts...



- There are nearly 600 skeletal muscles that make up nearly half of the total body weight in the human.
- Muscles can only pull they cannot push.
- Energy is stored in the muscles in a chemical called ATP.
- Lactic acid is released when the muscles are overworked and lack O₂, making the muscles hurt or ache.
- Muscles are attached to bones by tendons.
- The biggest muscles in the body are the gluteus maximus muscles (buttocks), but the muscle that can exert the most force is the masseter (jaw muscle).

Skeletal System

Major Structures

bones and joints

Functions

- protects organs
- shapes & supports the body
- interacts with skeletal muscles allows for movement
- produces blood cells in the bone marrow
- stores minerals calcium and phosphorous



Interesting Facts...

- A baby is born with 270 bones while an adult body has 206 bones.
- The hands and feet contain half of the bones in the human body.
- Bones are made of the hard mineral calcium, living cells, blood vessels and nerves.
- Bones are made of several layers periosteum, compact bone, and spongy bone.
- A joint is where two bones meet.
- Joints can be fixed (the skull), ball-and-socket (shoulders and hips), pivot (neck), gliding (wrists), and hinged (fingers, elbows, and knees).

Reproductive System Functions

- produces gametes
- Eggs (female)
- Sperm (male)
- Allows for the continuation of the species.
- **Major Structures**
- ovaries, uterus, and (in females)
- testes and penis (in males)

The Reproductive System Functions to make new individuals by producing, storing and releasing specialized sex cells known as gametes.

Cells from the **male** reproductive system, known as **sperm**, must fuse with cells of the **female** reproductive system, known as **eggs**.





Interesting Facts...

- A person grows over 5 million times bigger changing from a single cell to a newborn human being.
- Humans grow for about 20 years, changing from a child to an adult.
- Male reproductive cells are called sperm, and female reproductive cells are called eggs.
- Sperm and eggs have only 23 chromosomes each.
- When joined together, sperm and egg make a whole cell called a <u>zygote</u> which can grow into a baby.

Nervous System

Major Structures

 brain, spinal cord, nerves, sense organs

Functions

 regulates behavior; maintains homeostasis; regulates other organ systems; controls sensory and motor functions



The Nervous System:

The nervous system is the number one communication center of the body. The basic cell type that carries the communications are neurons that transmit electrical impulses.



The nervous system is divided into two divisions:

• The Central Nervous System (CNS)– Responsible for relaying messages, processing and analyzing information.

• The Peripheral Nervous System – Receives information from the environment and relays commands from the CNS to the organs and glands

The Brain

Cerebrum

Cerebellum

Medulla oblongata

BRAIN STEM

The brain is the main switching area of the central nervous system.

Cerebrum – Responsible for voluntary activities of the body (Intelligence, learning and judgement)

Cerebellum – Coordinates muscle movement and

balance

Brain Stem – Consists of the pons and the medulla oblongata. Pass message between brain and body

Interesting Facts...

- The left half of the brain controls the right half of the body and vice-versa.
- The human brain is more powerful and complicated than the world's biggest computer. It can store millions of memories and do billions of calculations every day.
- The human body has over 100 billion neurons in all.
- The brain can receive over 100,000 signals per second.
- Messages whiz through the nerves at up to 270 mph.
- Neurons reaching from the spinal cord to the toes are the longest cells in the human body, measuring up to 4 feet in length.

Endocrine System

Functions:

- regulates body activities
- temperature, metabolism
- development, and reproduction
- maintains homeostasis
- regulates other organ systems
 <u>Major Glands (organs):</u>
- hypothalamus
- pituitary
- Pancreas
- Adrenal
- Thyroid
- testes and ovaries





Endocrine System

- Endocrine glands release <u>hormones</u>, <u>chemicals</u> that act as signals telling different parts of the body what to do.
- The body makes over 20 hormones, each with a different job to do.
- The blood carries hormones around the body until reaching the target organ, the body part needing it.
- Hormones can affect the way a person feels.
- As a person ages, the body makes less of some hormones.

Important Glands and Hormones of the Human Body

Gland	Hormone	Function
Pineal	Melatonin	Controls sleep and wake cycle
Thyroid	Thyroxine	Controls appetite and metabolism
Adrenal	Adrenaline	Deals with stressful situations
Thymus	Thymosin	T-cell development (fight diseases)
Ovary	Estrogen	Female reproduction
Testis	Testosterone	Male reproduction