The Body Systems

Vocab List:

发布会上 this list (1st page for our new unit).

As we move through the unit, update the page # of these vocabulary words to help you prepare and study!

• Absorption
• Cell
• Connective Tissue
• Coordinate
• Defense
• Epithelial Tissue
• Homeostasis
• Muscle Tissue
• Nervous Tissue
• Organs
• Regulation
• Tissues
Introduction

Summaries are shown in yellow; vocabulary = underlined.

The organ systems of the human body and other vertebrates help to maintain balance and perform a variety of functions.

The Body Worlds exhibit of preserved human bodies and allows visitors to view the amazing human body in never before seen ways.

This unit will introduce the major parts, functions, and interactions of each of the body systems.
Levels of Organization

- The levels of organization in a multicellular organism include **cells, tissues, organs, and organ systems**
- **Cells** - the basic unit in living things; specialized cells perform particular functions (EX heart cell)
- **Tissues** - are groups of similar cells that perform a single function (EX connecting muscle to bone)
- An **Organ** is a group of tissues that work together to perform a complex function (EX Eyes for sight)
- An **organ system** is a group of organs that perform closely related functions (EX the digestive system)
There are four basic types of tissues in the human body:

- **Epithelial tissue**
  - Glands and tissues that cover interior and exterior body surfaces

- **Connective tissue**
  - Provides support for the body and connects its parts

- **Nervous tissue**
  - Transmits nerve impulses throughout the body

- **Muscle Tissue**
  - Along with bones, helps the body to move
Tissues – Close Up

Epithelial Tissue  (magnification: 6000×)

Connective Tissue  (magnification: about 50×)

Nervous Tissue  (magnification: 1100×)

Muscle Tissue  (magnification: 150×)
Organ Systems

There are 11 organ systems of the human body that work together to maintain homeostasis in the body.

Homeostasis is the process by which organisms keep internal conditions relatively stable despite changes in external environments.

- Circulatory system
- Digestive system
- Endocrine system
- Excretory system
- Integumentary system
- Lymphatic & Immune systems
- Muscular system
- Nervous system
- Reproductive system
- Respiratory system
- Skeletal system
Circulatory System

**Function:**
- Brings $O_2$, nutrients, and hormones to cells; fights infection; removes cells wastes; helps to regulate body temperature

**Major Structures:**
- Heart, blood vessels (arteries & veins), blood
  - [Heart Video](#)

**Types of Cells:**
- Red blood cells = transport $O_2$
- White blood cells = fight infection
- Platelets = clotting to stop bleeding

**Works Closely With:**
- the [respiratory sys](#) in gas exchange;
- [digestive sys](#) to deliver nutrients to the cells of the body
- the [excretory sys](#) to filter/clean the blood
- the [endocrine sys](#) to deliver hormones
The connective blood vessels of the body carry the cells of the circulatory system.

The vessels can sometimes become blocked with plaque (fatty buildup) shown in yellow.
The heart muscle contacts an average of 72 times per minute, sending blood throughout the body through a series of blood vessels.

Sound File
Respiratory System

 '**Function:**

- **Gas Exchange** – collects $O_2$ needed for cellular respiration and removes excess $CO_2$ from the body

**Major Structures:**

- **Nose, mouth, pharynx, larynx, trachea, bronchi, bronchioles, lungs**

**Key Parts:**

- **Alveoli** – air sacs within the lungs for gas exchange takes place (diffusion)

**Works Closely With:**

- the **circulatory system** in gas exchange
With each breath, air enters our body through the air passageways and fills up our lungs.

Within each lung, the tiny alveoli are surrounded by blood vessels and oxygen and carbon dioxide diffuse in and out of the vessels.
Nervous System

Function:
- Recognizes and coordinates the body’s responses to changes in its internal and external environment (control center)

Major Structures:
- Brain, Spinal cord, peripheral nerves

Types of Cells:
- Neurons – cells; send the messages of the nervous system through electrical impulses

Works Closely With: sensory receptors and the five senses (sight, sound, smell, taste, and touch) to interpret stimuli from the environment
Astrocyte

Neurological cells within the brain and spinal cord
Muscular System

Function:

- Works with the skeletal system to produce voluntary movement; helps to circulate blood and move food through the digestive system.

Major Structures:

- 3 types of muscles

Types of Cells:

- **Skeletal Muscles** – usually attaches to bones and help with voluntary movement.
- **Smooth Muscles** – found in the walls of hollow structures (ex. stomach, blood vessels, intestines) and not under voluntary control.
- **Cardiac Muscles** – found only in the heart and not under voluntary control.

Works Closely With: the skeletal system to move the body, with the help of signals from the nervous system.
Muscular System

Function:
- Works with the skeletal system to produce voluntary movement; helps to circulate blood and move food through the digestive system.

Major Structures:
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Types of Cells:
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Works Closely With: the skeletal sys to move the body, with the help of signals from the nervous sys.
Muscles in Action

Muscle groups work in opposition to each other.

When the bicep contracts, the tricep relaxes.
Skeletal System

 função: 

- Supports the body; protects internal organs; allows movement; stores mineral reserves; provides a site for blood cell formation

- Major Structures:
  - Bones, joints, cartilage, ligaments, tendons

- Types of Cells:
  - Osteoblasts – build and produce new bone
  - Osteoclasts – break down bone
  - Bone Marrow – within the hollow center of bones, produces red & white blood cells and platelets

 Works Closely With: the 206 bones in the adult body works with the muscular sys to move the body; circulatory sys to make blood cells
With bone loss, the outer shell of a bone becomes thinner and the interior becomes more porous. Normal bone (A) is strong and flexible.

Osteoporotic bone (B) is weaker and subject to fracture.
Integumentary System

**Function:**
- Serves as a barrier against infection and injury; helps to regulate body temperature; provides protection against ultraviolet radiation from the sun

**Major Structures:**
- Skin, hair, nails, sweat and oil glands

**Key Parts:**
- Epidermis – outer layer of skin
- Dermis – inner layer of skin
- Hair – protects the skin and filters particles
- Nails – extension of the skin, grow 3 mm per day on average

**Works Closely With:** nervous sys through the five senses
Burns and the Integumentary System

1st degree burn

3rd degree burn
Reproductive Systems

Function:
- Produces reproductive cells; in females, nurtures and protects developing embryo

Major Structures:
- Testes, epididymis, vas deferens, urethra, and penis (in males); ovaries, Fallopian tubes, uterus, vagina (in females)

Types of Cells:
- Sperm – male reproductive cells created in the male reproductive system
- Ova – female egg cells created in the female reproductive system

Works Closely With: endocrine sys to receive sex hormones & immune sys to fight STD’s (sexually transmitted diseases)
Female System

Video

Male System

Diagram
When sexual activity releases sperm into the female reproductive system, fertilization can take place.

- Photo – fetus at 8 weeks

- Video

- Slideshow of Conception
Digestive System

Function:
- Converts foods into simpler molecules that can be used by the cells of the body; absorbs energy; eliminates wastes

Major Structures:
- Mouth, pharynx, esophagus, stomach, small and large intestines, rectum

Key Parts:
- Villi – folded structures within the walls of the intestines which allow for nutrients to pass through

Works Closely With: circulatory sys to deliver nutrients to the cells of the body
The villi projections allow as much of the nutrients in the digestive system to move into the circulatory system, providing energy for cells.
Excretory System = Waste System

Function:
- Eliminates waste products from the body in ways that maintain homeostasis

Major Structures:
- Skin, lungs, kidneys, ureters, urinary bladder, urethra

Key Parts:
- Kidneys – remove waste products from the blood
- Bladder – collects urine (wastes filtered from the kidney)

Works Closely With: the circulatory system to filter and clean the blood
Endocrine System

**Function:**
- Controls growth, development, and metabolism; maintains homeostasis using hormones

**Major Structures:**
- Glands within the body - Hypothalamus, pituitary, thyroid, parathyroids, adrenals, pancreas, ovaries (in females), testes (in males)

**Key Parts:**
- Hormones – chemicals released in one part of the body, travel through the bloodstream, and affect cells in other parts

**Works Closely With:** the nervous sys which controls the release of hormones and the circulatory sys to deliver them
Transgendered

 `- Both of these individuals are transgendered; they identify as opposite the sex of their birth.

 `- What hormones might these individuals take to cause their bodies to shift in appearance?
Lymphatic & Immune Systems

- **Lymphatic Function:**
  - Collects fluid lost from blood vessels and returns the fluid to the circulatory sys

- **Immune Function:**
  - Helps protect the body from disease;

- **Major Structures:**
  - White blood cells, thymus, spleen, lymph nodes, lymph vessels

- **Key Parts:**
  - White blood cells – when damage occurs, these cells enter to fight infection

- **Works Closely With:** circulatory sys to deliver the infection fighting cells and collect excess fluids
HIV/AIDS

- What body system is weakened from this virus?
- How many infections happen daily?
- Is there a vaccine for this virus?
- Listen for the answer! Video
- From form information on HIV/AIDS, go to PubMed or the CDC.