

Human Anatomy and Body Systems



Levels of Organization

Remember, the human body is organized in several levels, from the simplest to the most complex. . .

Cells – the basic unit of life

Tissues – clusters of cells performing a similar function

Organs – made of tissues that perform one specific function

Organ Systems – groups of organs that perform a specific purpose in the human body

***The purpose of the 11 organ systems is for the human body to maintain **homeostasis**.

The 11 Human Body Systems

The 11 human body systems are as follows:

- nervous system
- respiratory system
- excretory system
- muscular system
- endocrine system
- lymphatic (immune) system
- integumentary system
- digestive system
- skeletal system
- circulatory system
- reproductive system

The Digestive System

Purpose: to convert food particles into simpler micromolecules that can be absorbed into the bloodstream and used by the body

Major Organs and their Functions:

Mouth – to chew and grind up food

-- saliva also begins the chemical breakdown

Esophagus – pipe connecting mouth to stomach

Stomach – secretes an extraordinarily strong acid (pH = 2) that leads to breakdown of food

-- once the food is broken down in the stomach and mixed with digestive juices, it is called **chyme**

Pancreas – produces the hormone **insulin** that regulates blood sugar levels

-- also helps neutralize stomach acid

Liver – produces bile, which breaks down fats in foods

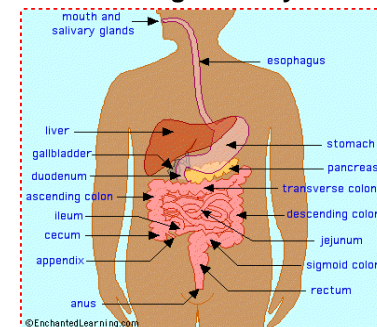
Gallbladder – pouch-like organ that stores **bile** for future use

Small Intestine – after digestion is complete, chyme enters the small intestine where it is absorbed into the bloodstream

-- the chyme is propelled along by folded surfaces called **villi**, on the intestine

Large Intestine – removes water from the chyme and gets the waste ready for excretion

The Digestive System



The Excretory System

Purpose: to rid the body of wastes, including excess water and salts

Major Organs and Their Functions

Kidneys – the main organs of the excretory system

-- waste-laden blood enters the kidney and the kidney **filters** out urea, excess water and other waste products, which eventually travel out of the kidney as urine

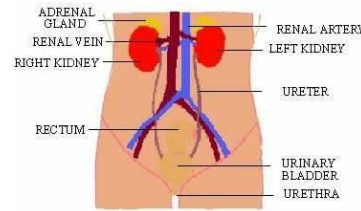
-- eventually they travel through the **ureter** to the urinary **bladder**

Rectum – solid (food) waste travels out of the body through the rectum

Skin – sweat glands remove excess water and salts from the body

Lungs – expel the waste gas carbon dioxide

The Excretory System



The Respiratory System

Purpose: to provide the body with a fresh supply of oxygen for cellular respiration and remove the waste product carbon dioxide

Major Organs and Their Functions

Nose – internal entry and exit point for air

Pharynx – serves as a passage way for both air and food at the back of the throat

Larynx – your “voicebox”, as air passes over your vocal chords, you speak

Trachea – the “windpipe”, or what connects your pharynx to your lungs

-- a piece of skin, called the **epiglottis**, covers the trachea when you swallow, preventing food from entering

Bronchi – the two large passageways that lead from the trachea to your lungs (one for each lung)

-- the bronchi are further subdivided into bronchioles

-- eventually, the further subdivisions lead to tiny air sacs called **alveoli**

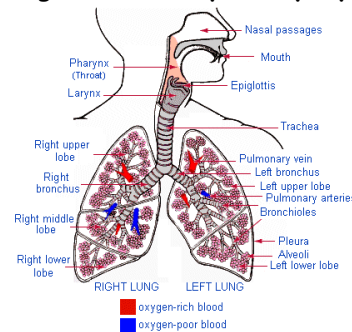
-- alveoli are in clusters, like grapes

-- capillaries surrounding each alveolus is where the exchange of gases with the blood occurs

The **diaphragm** is the muscle that causes you to breathe

-- hiccups are involuntary contractions of the diaphragm

Image of the Respiratory System



The Circulatory System

Purpose: to deliver oxygenated blood to the various cells and organ systems in your body so they can undergo cellular respiration

Major Organs and Their Functions

Heart – the major muscle of the circulatory system

-- pumps blood through its four chambers (two ventricles and two atria)

-- pumps deoxygenated blood into the lungs, where it gets oxygenated, returned to the heart, and then pumped out through the aorta to the rest of the body

-- valve regulate the flow of blood between the chambers

Arteries – carry blood away from the heart and to the major organs of the body

Veins – carry blood back to the heart away from the major organs of the body

Capillaries – small blood vessels where gas exchange occurs

Blood – the cells that flow through the circulatory system

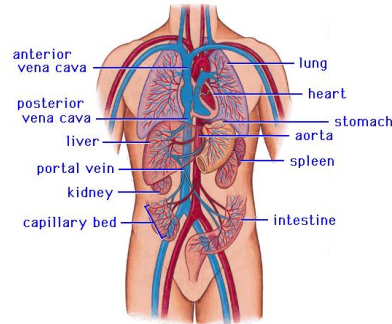
-- red blood cells contain **hemoglobin**, an iron-rich protein that carries oxygen

-- white blood cells function in the immune system

-- platelets help in blood clotting

Spleen – helps to filter out toxins in the blood

Image of the Circulatory System



The Nervous System

Purpose: to coordinate the body's response to changes in its internal and external environment

Major Organs and Their Functions

Brain – control center of the body, where all processes are relayed through

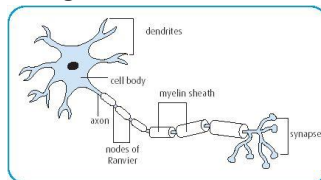
-- consists of cerebrum (controls thought and senses) and cerebellum (controls motor functions)

Spinal Cord – sends instructions from the brain to the rest of the body and vice versa

-- any organism with a major nerve cord is classified as a **chordate**

Nerves – conduct impulses to muscle cells throughout the body

Diagram of a Nerve Cell

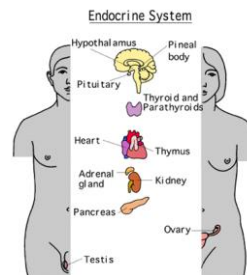


The Endocrine System

Purpose: to control growth, development, metabolism and reproduction through the production and secretion of hormones

Major Organs

- hypothalamus
- pituitary gland
- thyroid
- parathyroid
- adrenal glands
- pancreas
- testes
- ovaries



The Skeletal System

Purpose: to provide structure and support to the human body

Bones are where new blood cells are generated (in the marrow), and require the mineral **calcium** for strength

Major Bones of the Human Body

- | | |
|--------------------------------|------------------------------|
| -- femur (thigh bone) | -- humerus (upper arm) |
| -- radius and ulna (lower arm) | -- cranium (skull) |
| -- sternum (breastbone) | -- clavicle (shoulder blade) |
| -- fibula and tibia (calf) | -- vertebrae (back) |
| -- scapula (shoulder) | -- pelvic bone |
| -- coccyx (tail bone) | -- phalanges (fingers/toes) |

The Muscular System

Purpose: works with the skeletal and nervous system to produce movement, also helps to circulate blood through the human body

- muscle cells are fibrous
- muscle contractions can be voluntary or involuntary

Major Muscles in the Human Body

- biceps
- triceps
- deltoids
- glutes
- hamstrings

The Immune System

Purpose: to remove infectious diseases and other pathogens from the human body

Major Organs and Their Functions

Skin – also called the integumentary system, the skin is the body's first line of defense

White Blood Cells – recognize disease agents (antigens) and create antibodies to tag and remove these antigens

- phagocytes are the white blood cell type that actually eats and destroys these antigens

Lymph Nodes – help restore fluid lost by the blood and return it to the circulatory system