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 12 Human Body Systems

The 11 human body systems are as follows:

-- nervous system

-- respiratory system

-- excretory system

-- muscular system

-- endocrine system

--female reproductive

-- integumentary system

-- digestive system

-- skeletal system

-- circulatory system

-- Immune system

--male reproductive

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 help neutralize stomach acid

Liver – produces bile, which breaks down fats in foods

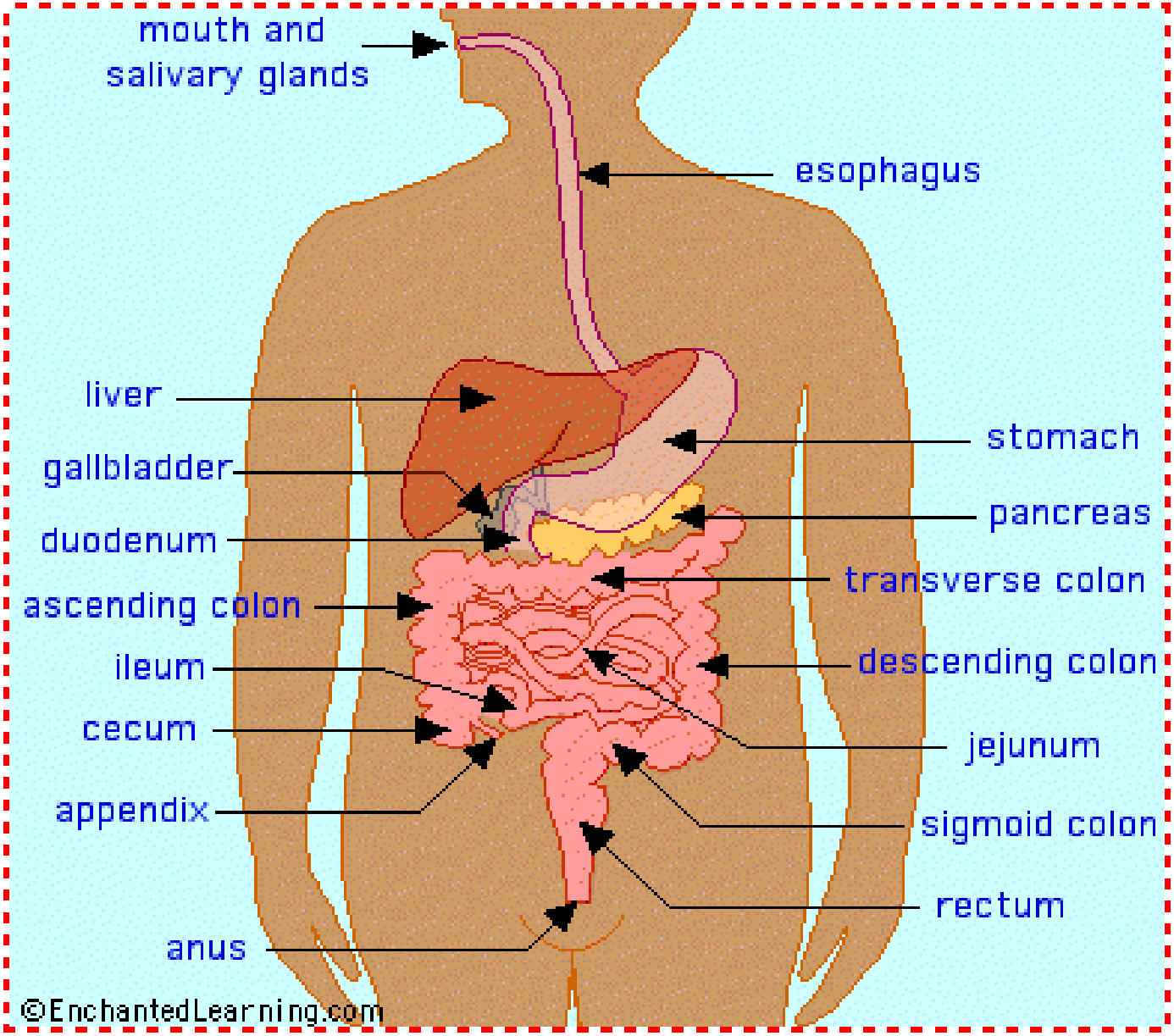
Gallbladder – pouch-like organ that stores **bile** for future use

Small Intestine – after digestion is complete, the 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 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

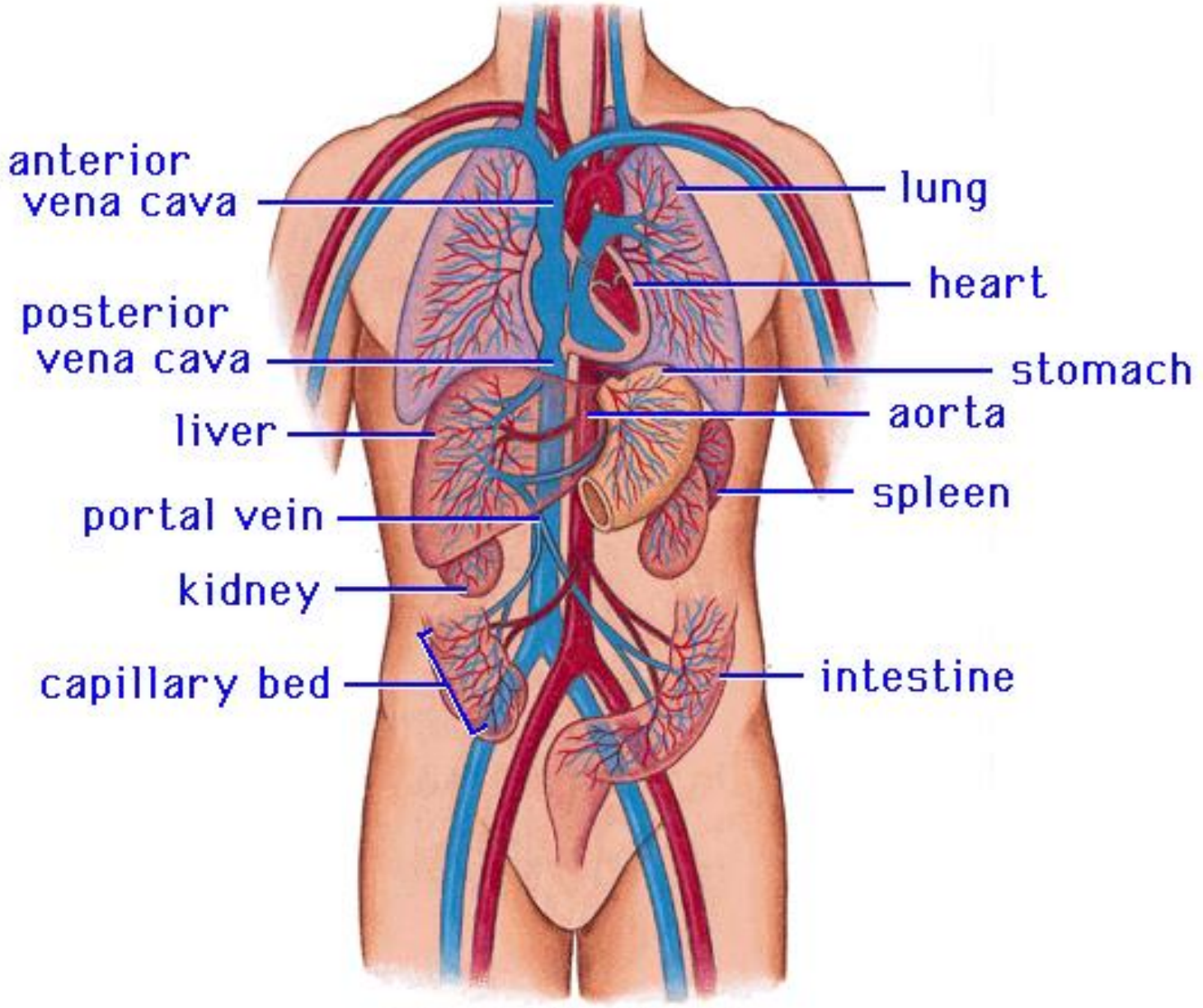
-- red blood cells contain **hemoglobin**, an iron-rich protein that carries oxygen

-- 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 Excretory System aka The Urinary 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 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.**

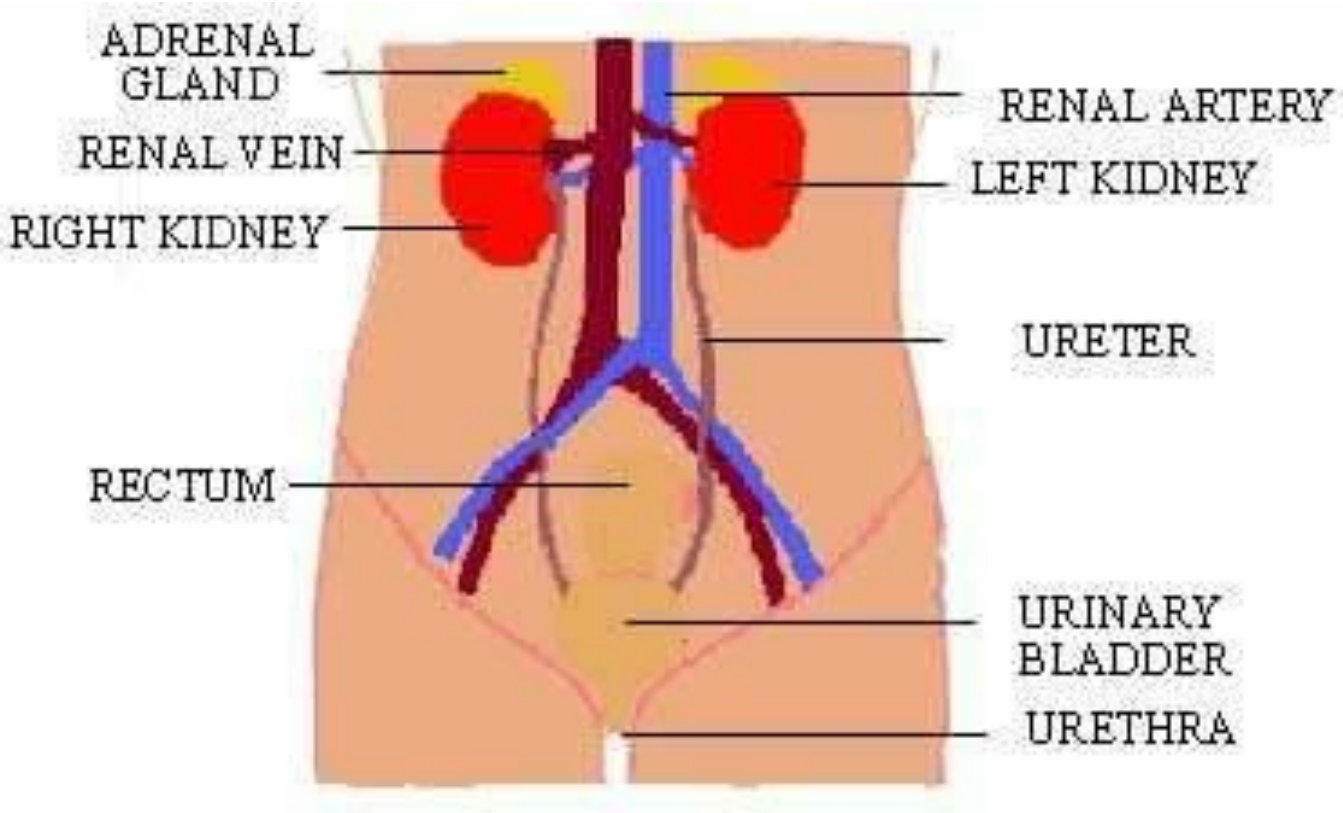
Liquid waste exits the body as urine through the **urethera.**

Rectum – solid (food) waste travels out of the body through the digestive tract's end, the rectum

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

Lungs – expel the waste gas carbon dioxide

The Excretory System



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)

-- radius and ulna (lower arm)

-- sternum (breastbone)

-- fibula and tibia (calf)

-- scalpula (shoulder)

-- coccyx (tail bone)

-- humerus (upper arm)

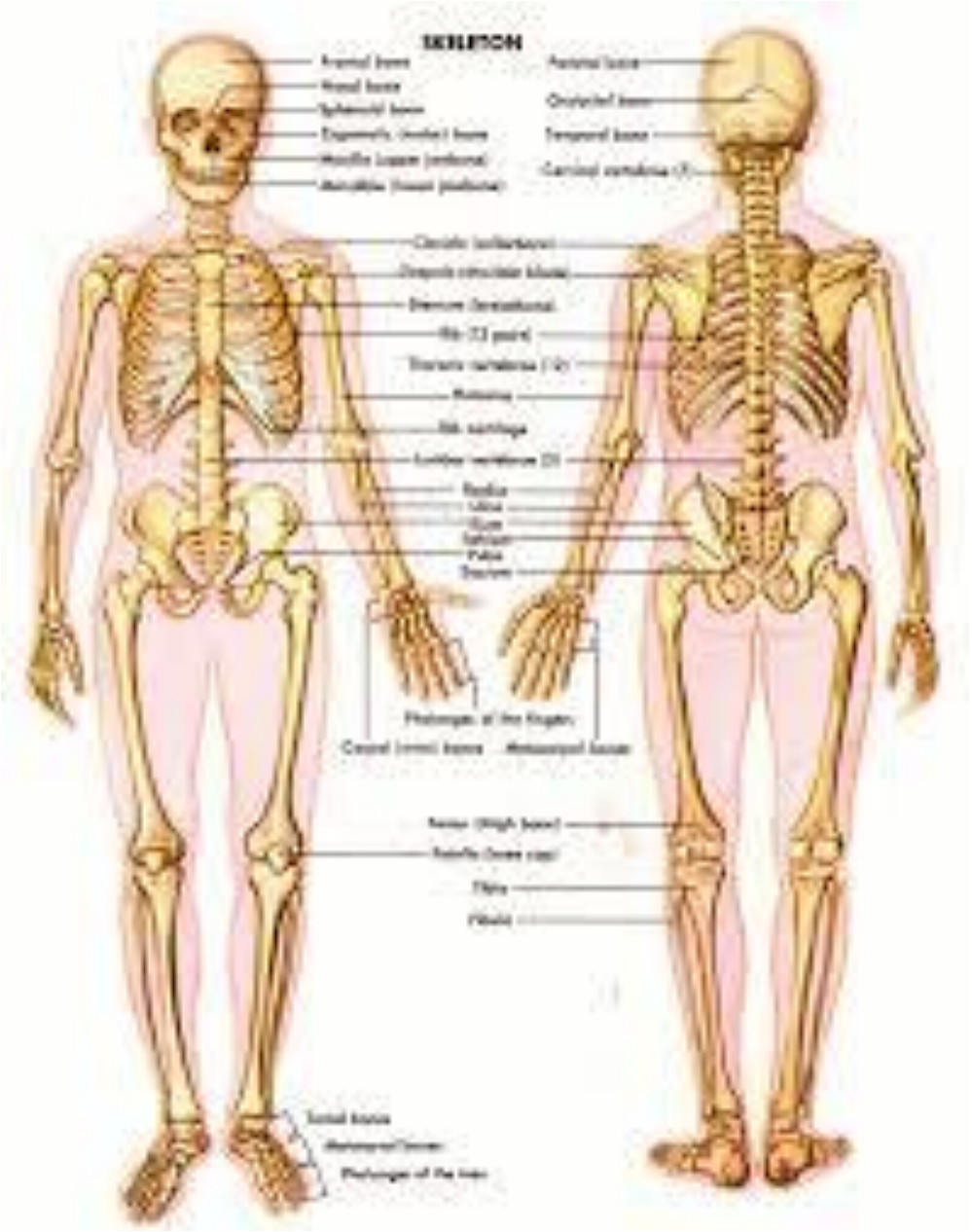
-- cranium (skull)

-- clavicle (collar bone)

-- vertebrae (back)

-- pelvic bone

-- phalanges (fingers/toes)



The skeleton works closely with the muscular system as muscles allows bones to move. It also works with the circulatory system as it generates new blood cells.

The Muscular System

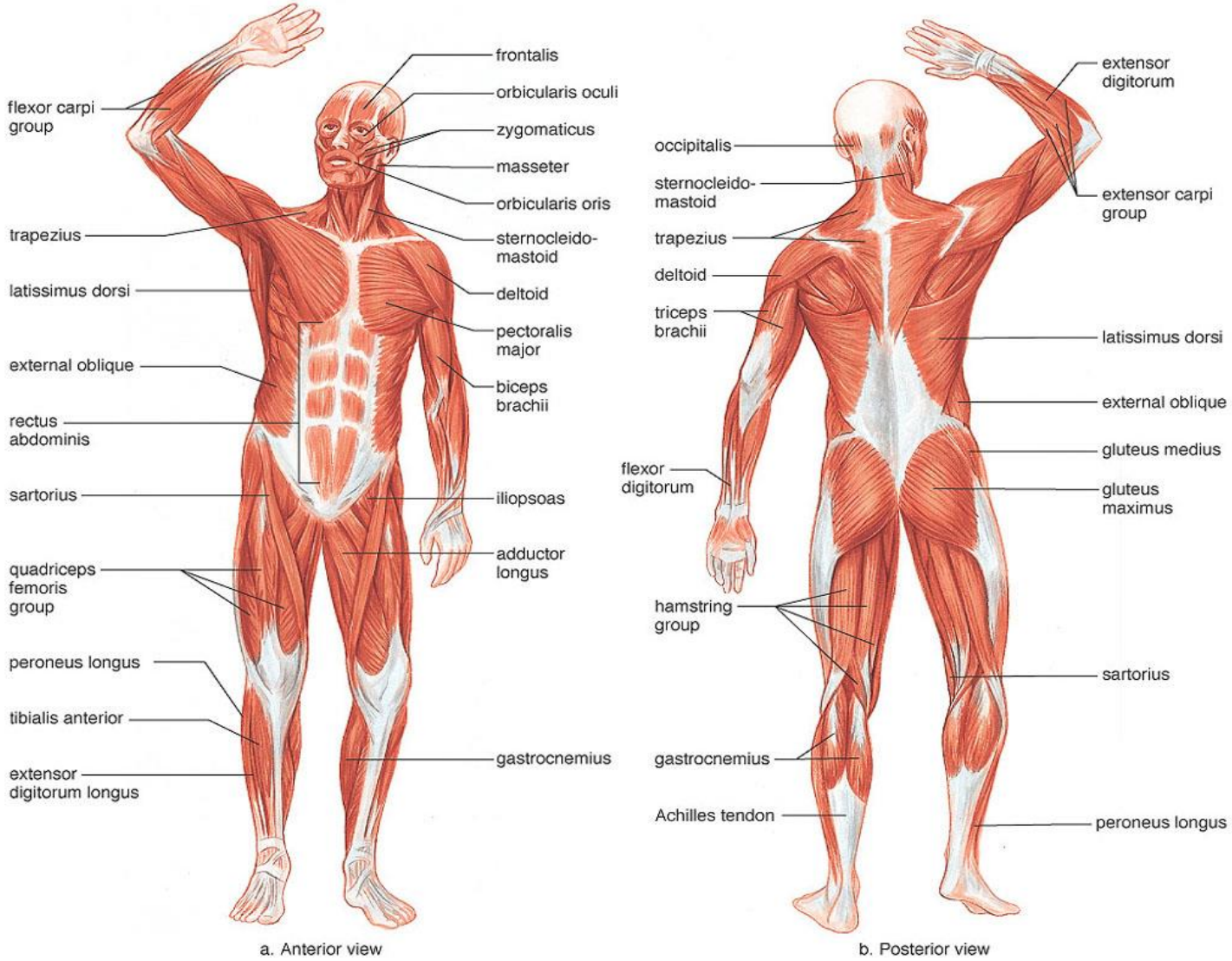
Purpose: works with the skeletal and nervous system to produce movement, also helps to circulate blood through the human body

-- muscle cells are fibrous

-- muscle contractions can be voluntary or involuntary

3 types of muscles:

- Visceral (aka smooth muscle)-muscles that contract involuntarily. These are your weakest muscles and they make up your organs such as stomach, lungs, etc.
- Cardiac (aka heart muscle)- very strong, striated muscle that involutatrily contracts at regular intervals to keep your heart pumping.
- Skeletal muscles- voluntary muscles that are connected to bones and cause movement.



Major Muscles in the Human Body

-- biceps (upper-arms)

-- deltoids (Shoulders)

-- glutes (butt cheeks)

-- hamstrings (thighs)

The Integumentary System

Purpose: to protect internal organs from environmental threats and help regulate body temperature.

Major Organs and Their Functions

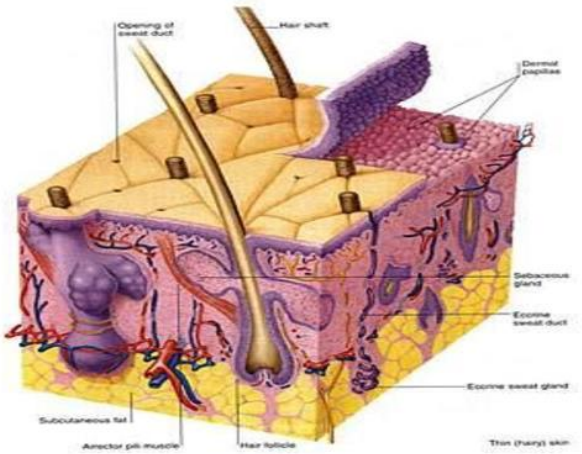
Skin –the body's first line of defense against infectious diseases and airborne viruses.

Can help cool the body through sweat glands.

Hair- Protects sensitive and vulnerable areas from dust, foreign liquids, and other threats (think nose hair, eyebrows, etc.)

Nails - protect sensitive appendages

(fingers and toes) from injury



The Respiratory System

Purpose: to provide the body with a fresh supply of oxygen for 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 breath

-- hiccups are involuntary contractions of the diaphragm

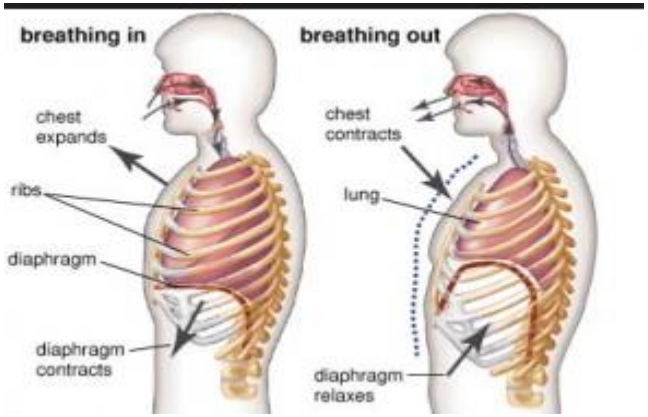
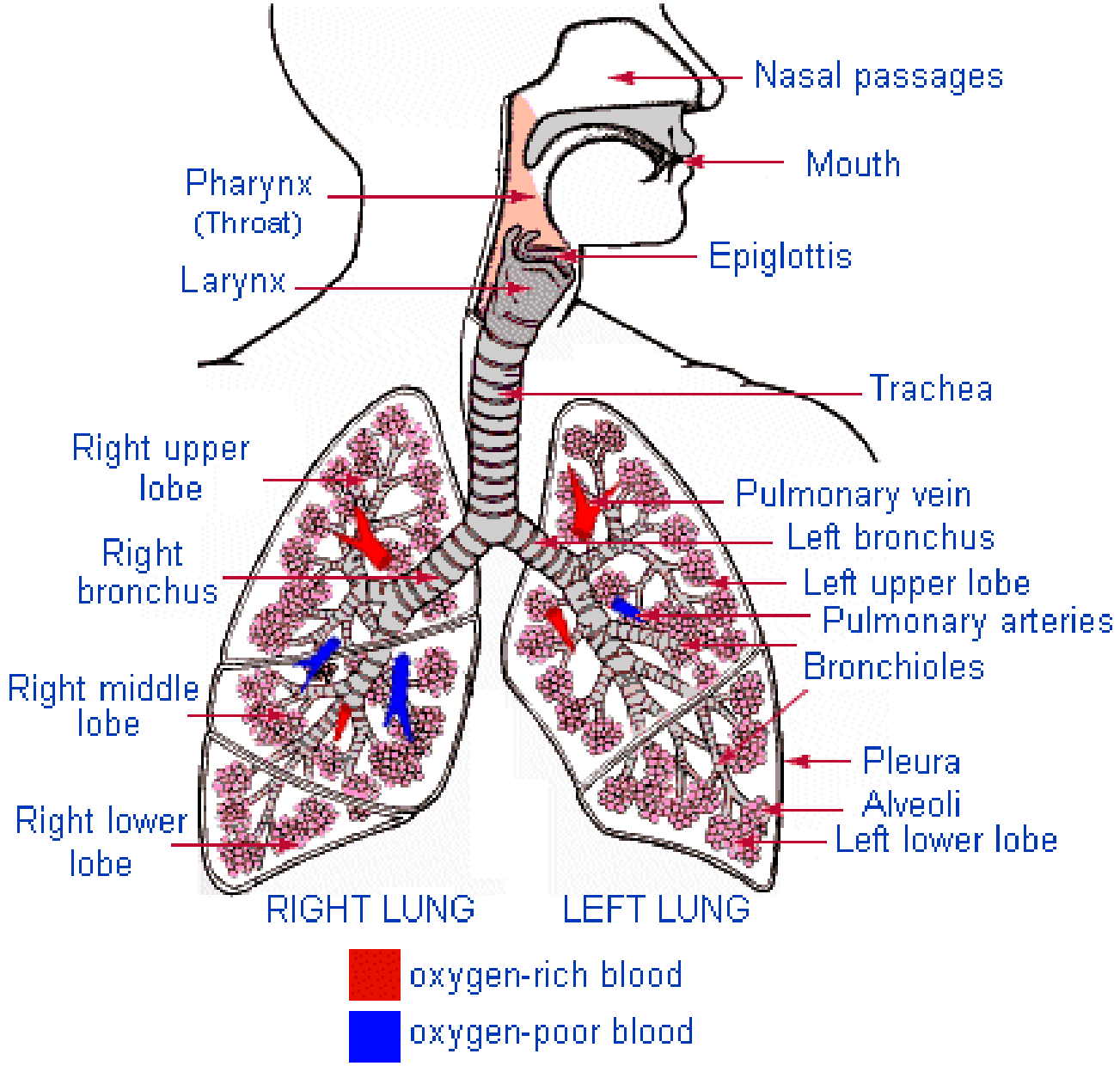


Image of the Respiratory System



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 though and senses) and cerebellum (controls motor functions)

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

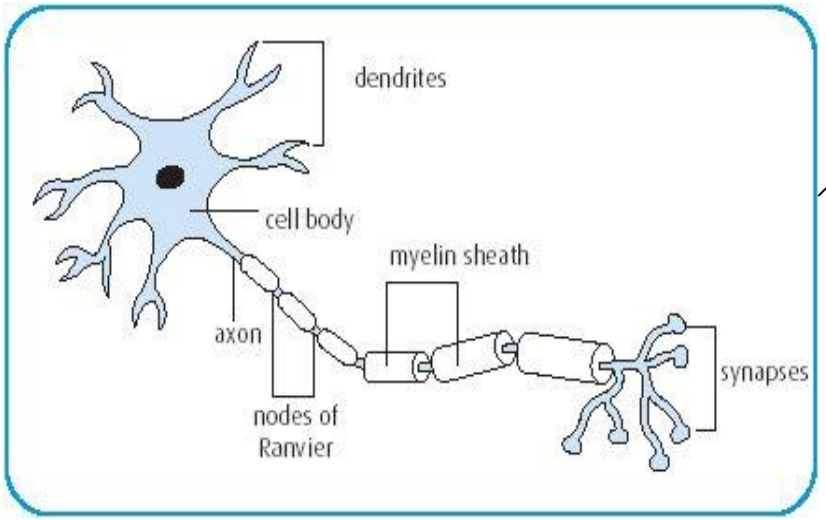
-- any organism with a major nerve cord is classified as a **chordate**

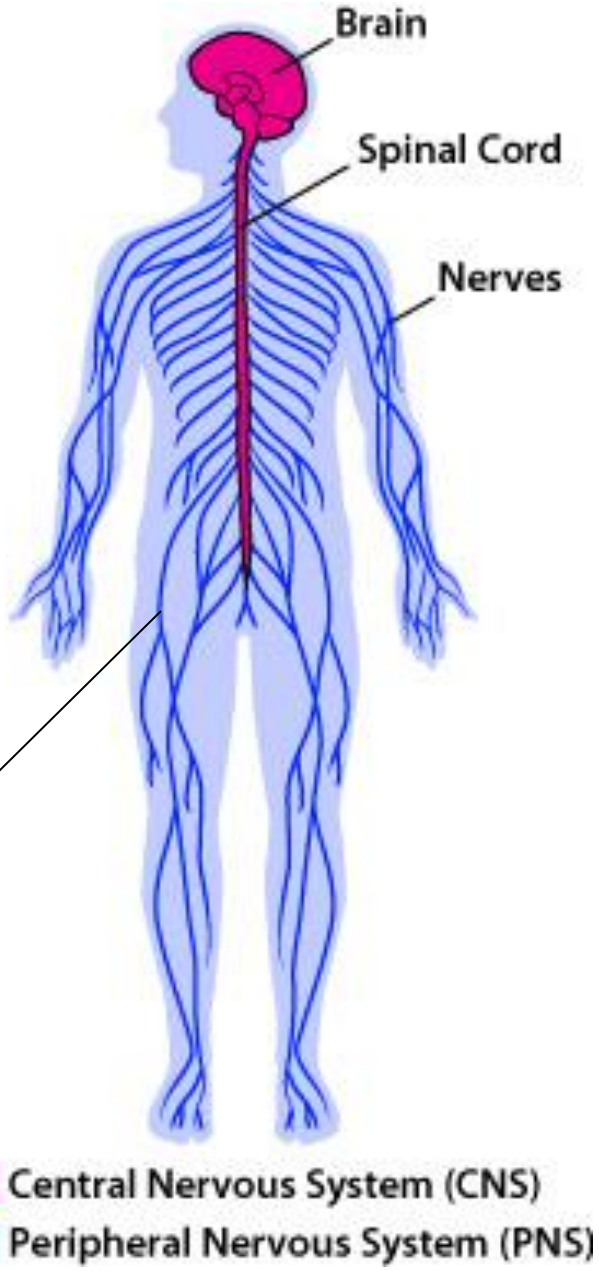
Nerves – conduct impulses to muscle cells throughout the body

Diagram of a Nerve Cell

Central Nervous System: contains the brain and spinal cord- controls all body parts.

Peripheral Nervous System: The nerves- deliver messages to all other parts of the body.





The Endocrine System

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

Major Organs

-- hypothalamus

-- pituitary gland

-- thyroid

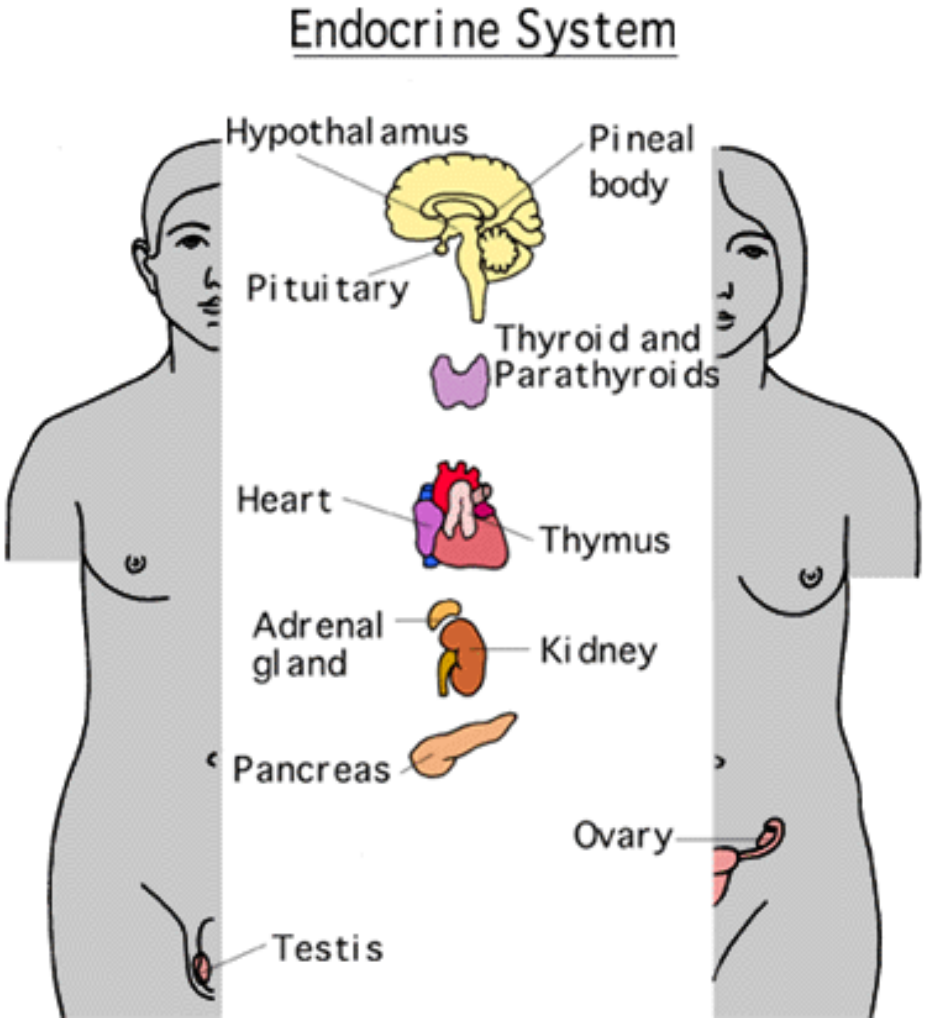
-- parathyroid

-- adrenal glands

-- pancreas

-- testes

-- ovaries



Endocrine Hormones

Gland	Hormones	Functions
Thyroid	Thyroxine	Regulates metabolism
	Calcitonin	Inhibits release of calcium from the bones
Parathyroid's	Parathyroid hormone	Stimulates the release of calcium from the bones.
Islet cells (in the pancreas)	Insulin	Decreases blood sugar by promoting uptake of glucose by cells.
	Glucagon	Increases blood sugar by stimulating breakdown of glycogen in the liver.
Testes	Testosterone	Regulates sperm cell production and secondary sex characteristics.
Ovaries	Estrogen	Stimulates egg maturation, controls secondary sex characteristics.
	Progesterone	Prepares the uterus to receive a fertilized egg.
Adrenal cortex	Epinephrine	Stimulates "fight or flight" response.
Adrenal medulla	Glucocorticoids	Part of stress response, increase blood glucose levels and decrease immune response.
	Aldosterone	Regulates sodium content in the blood.
	Testosterone (in both sexes)	Adult body form (greater muscle mass), libido.
Pineal gland	Melatonin	Sleep cycles, reproductive cycles in many mammals.

The Immune System

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

Major Organs and Their Functions

Skin – also part of 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 destroys these antigens

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

The Female Reproductive System

Purpose: Allows an organism, in this case, a human, to produce offspring.

Major Organs and Their Functions-

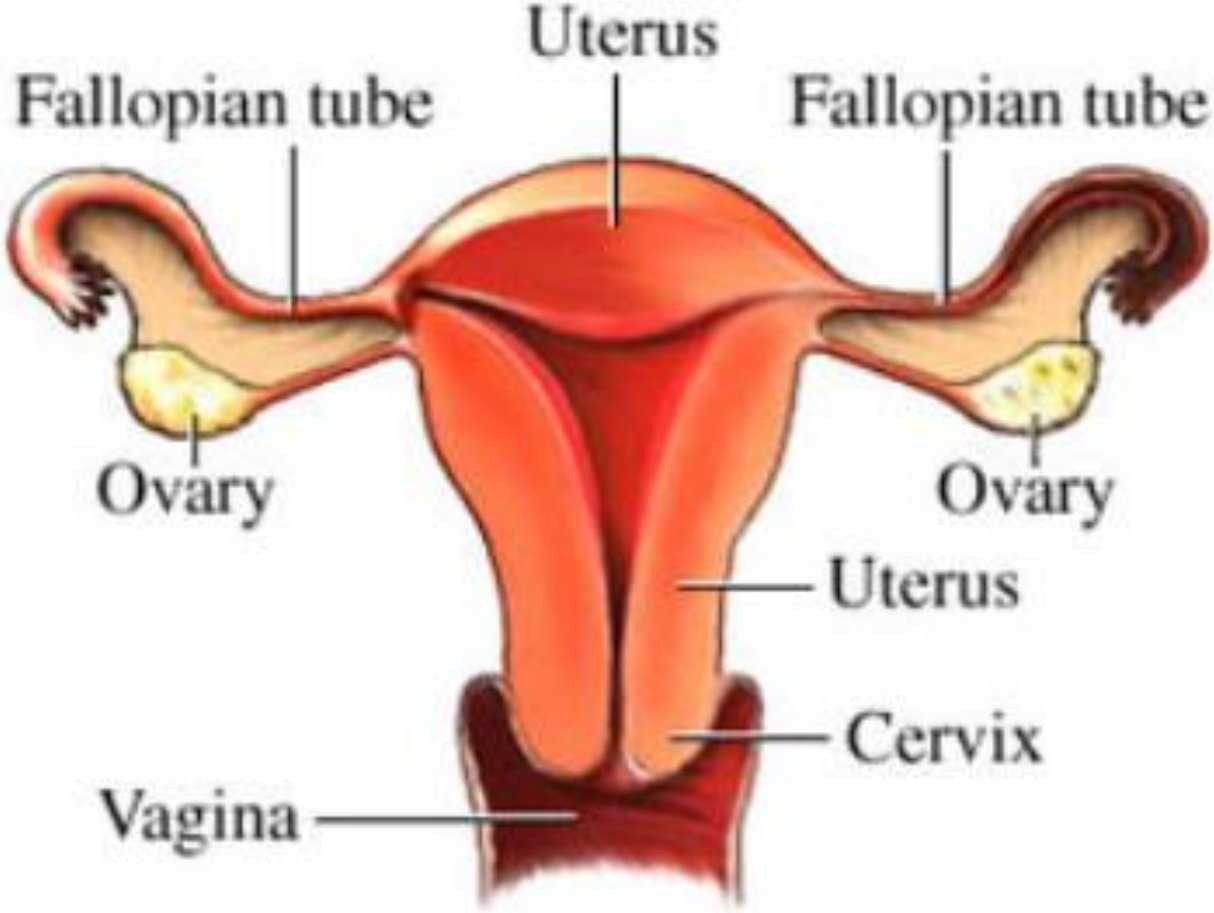
Ovaries- Oval shaped organs that produce, store, and periodically release eggs.

Fallopian Tubes- The pathway eggs take from the ovaries into the uterus.

Uterus- aka the womb. The muscular area that expands and contracts to accommodate a growing fetus. During pregnancy, the thick lining for the uterus protects the fetus.

Vagina- A muscular, hollow pathway through that acts as an entrance and exit for reproductive system (ex. Baby during birth, menstruation)

Female Reproductive System



The Male Reproductive System

Purpose: Allows an organism, in this case, a human, to produce offspring.

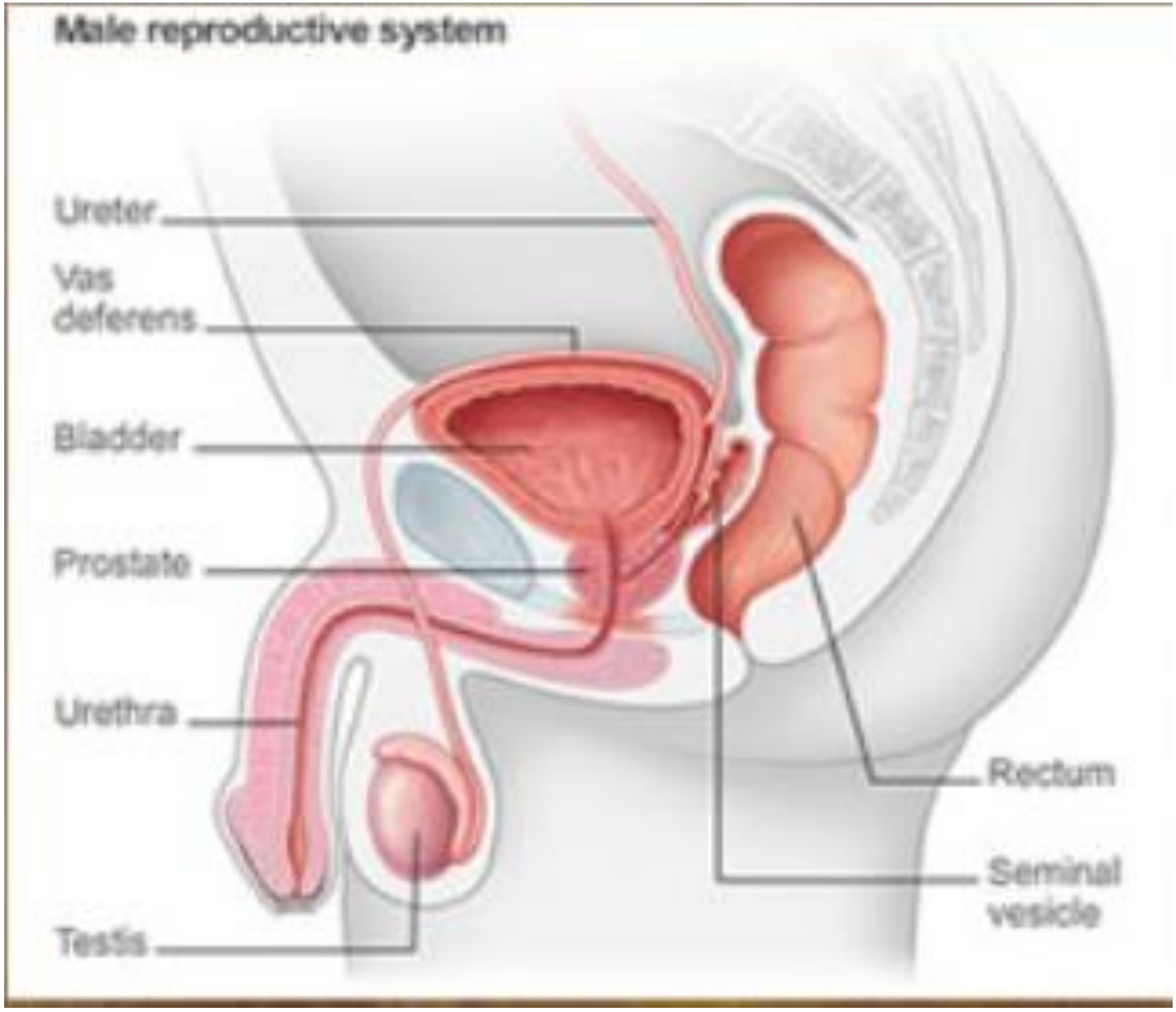
Major Organs and Their Functions-

Testicles- Also part of the endocrine system. Responsible for production of testosterone and the production and storage of sperm.

Epididymis – A tubular muscle that carries semen from the testicles to the penis.

Seminal Vesicles and Prostate Glands- Provide fluids that mix with sperm forming semen.

Penis-The pathway through which semen and urine exit the body.


Male reproductive system
Ureter
Vas deferens
Bladder
Prostate
Urethra
Testis
Rectum
Seminal vesicle