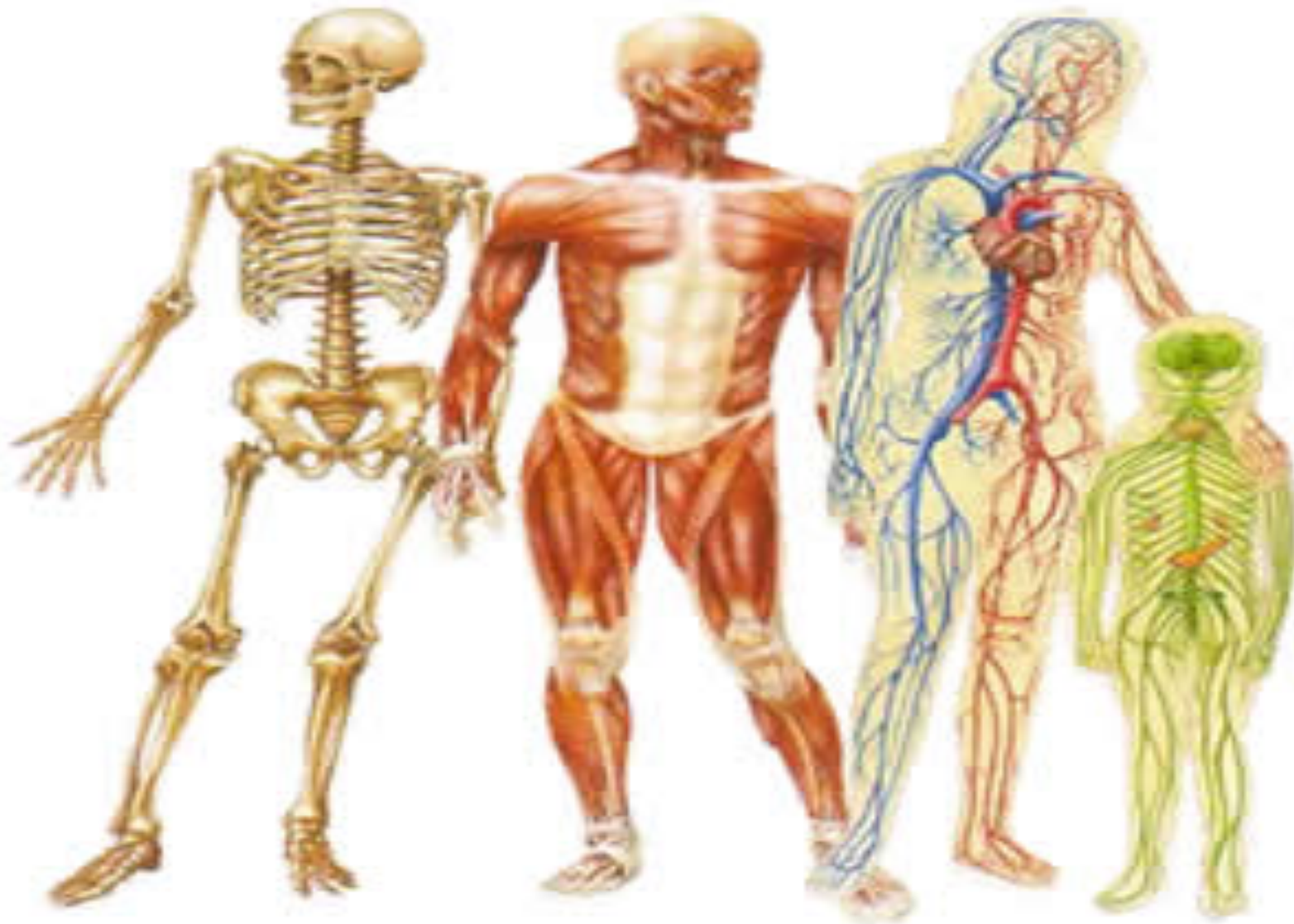


Human Anatomy and Body Systems



Levels of Organization

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**.

Human homeostasis is derived from the Greek, homeo or "same", and stasis or "stable" and means remaining stable or remaining the same.

Homeostasis - "Maintaining a balanced internal environment."

In humans, homeostasis happens when the body regulates body temperature in an effort to maintain an internal temperature around 98.6 degrees Fahrenheit. For example, we sweat to cool off during the hot summer days, and we shiver to produce heat during the cold winter season.

The 11 Human Body Systems

The 11 human body systems are:

1. digestive system
2. excretory system
3. respiratory system
4. circulatory system
5. nervous system
6. skeletal system
7. muscular system
8. lymphatic (immune) system
9. integumentary system
- 10-11. endocrine system (includes 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 help neutralize stomach acid

Liver – produces bile, which breaks down fats in foods

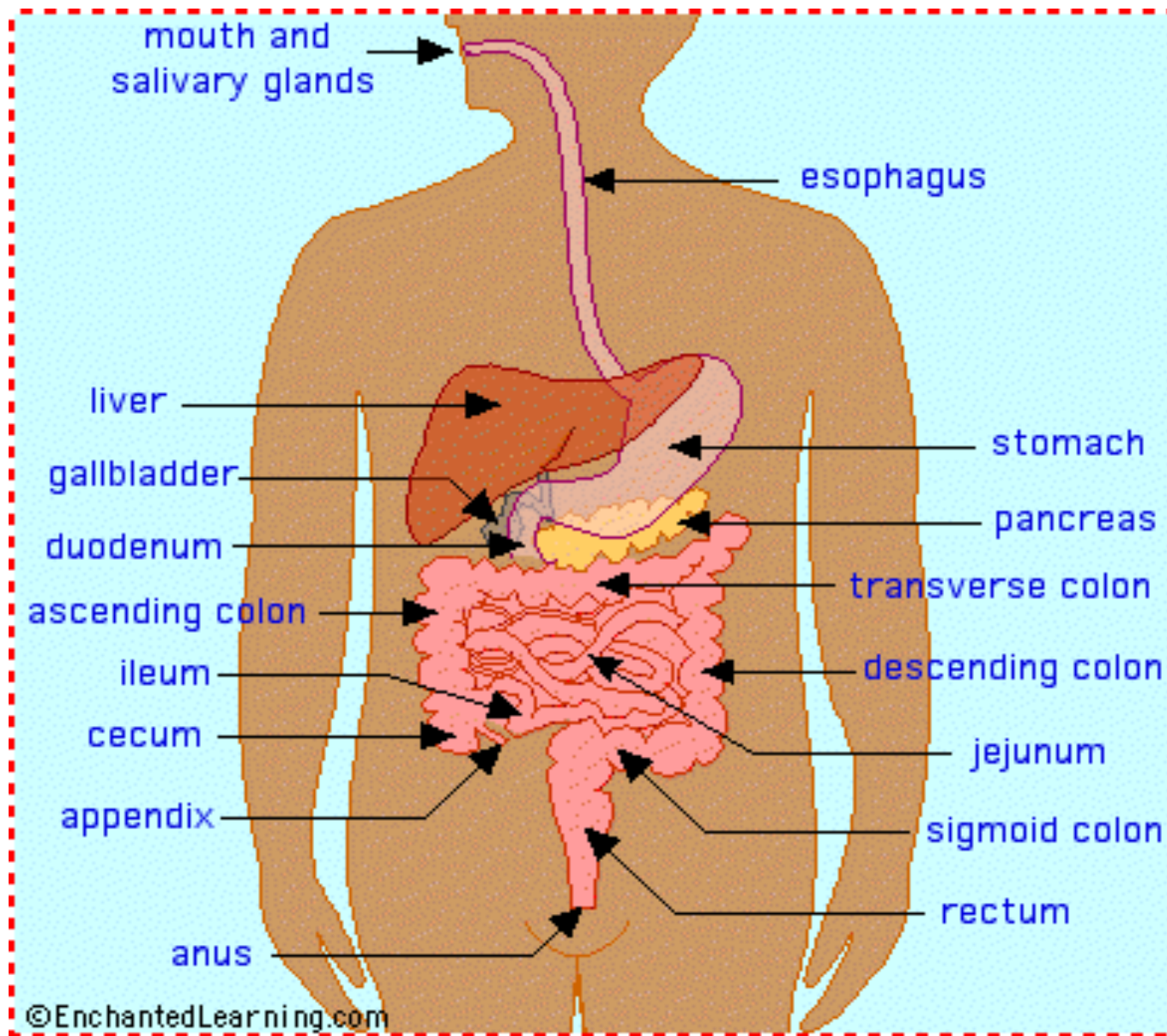
Gallbladder – pouch-like organ that stores **bile** for future use

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 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

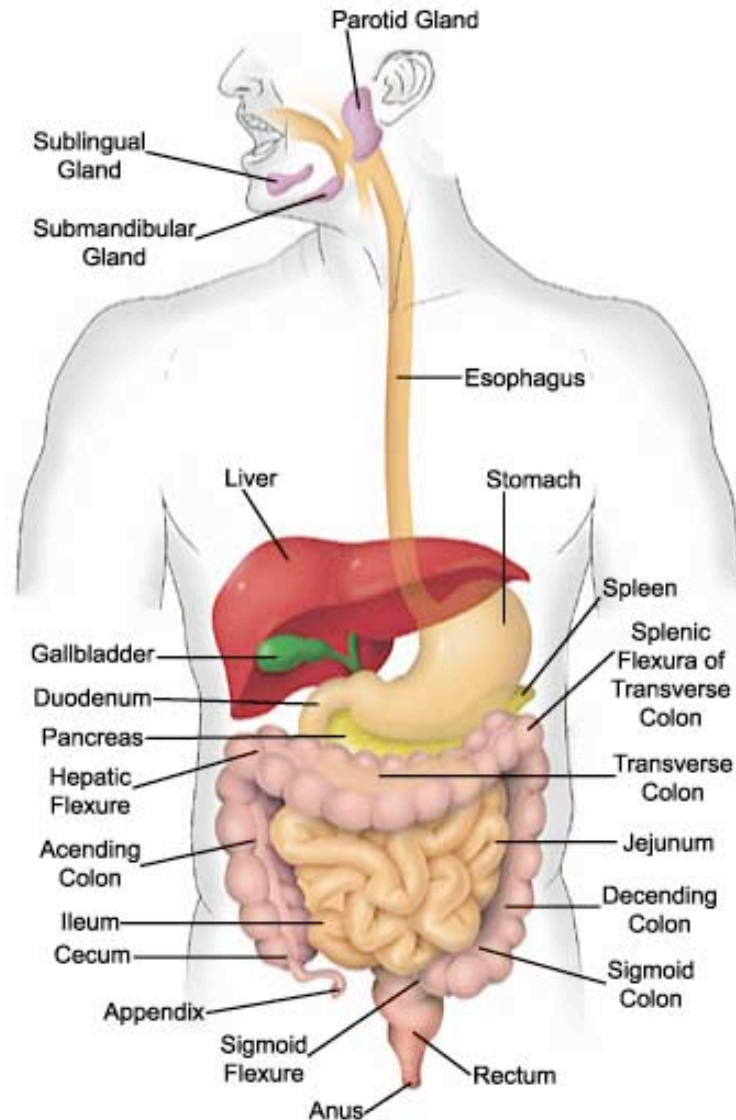
-- waste-laden blood enters the kidney and the kidney **filters** out urea, excess water and other waste products, which eventually travel out of the kidney as urine

-- 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 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

Lungs -

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**

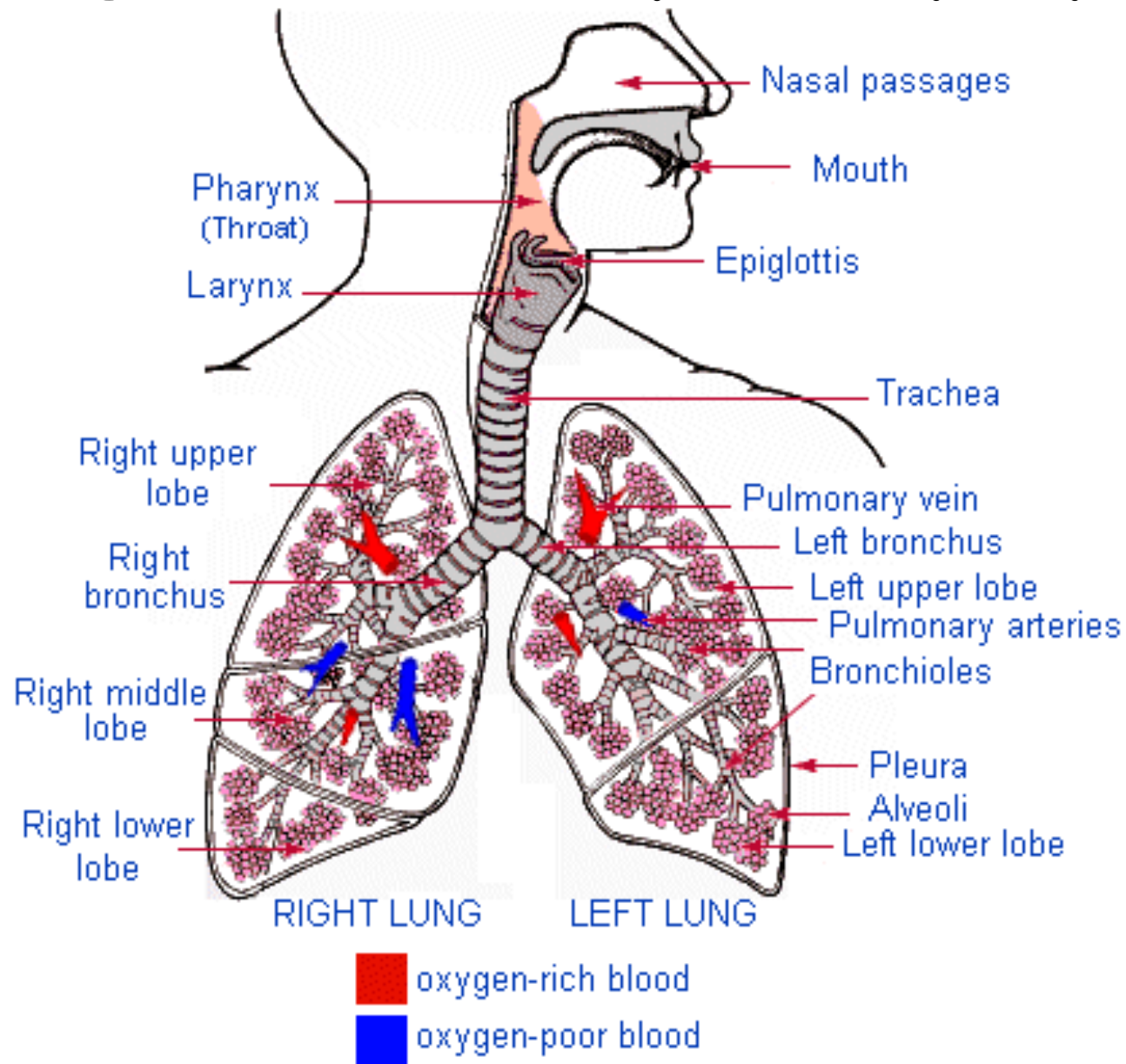
 - alveoli are in clusters, like grapes

 - 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 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

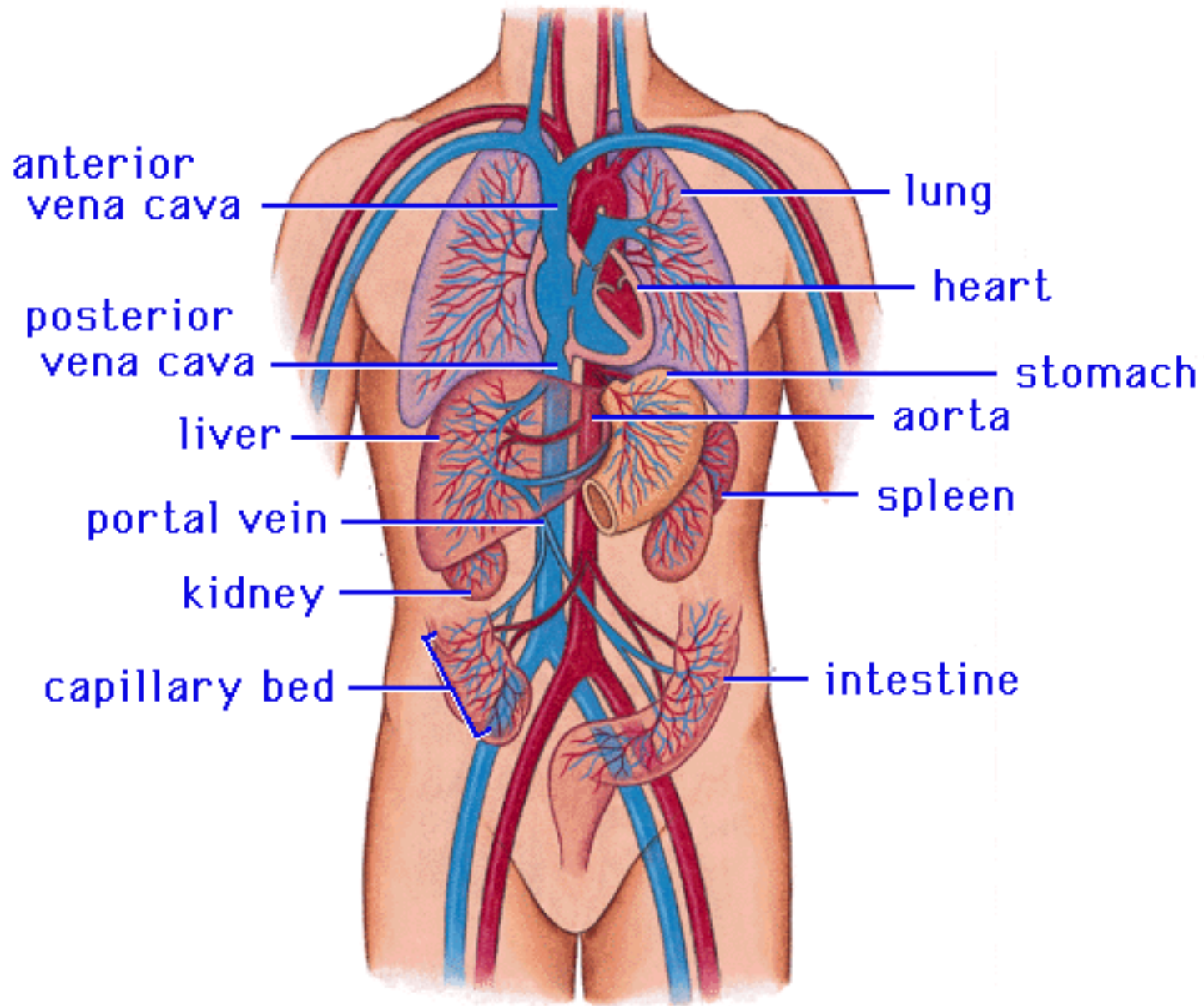
-- red blood cells contain hemoglobin, an iron-rich protein that carries oxygen

-- white blood cells function in the immune system

-- platelets help in blood clotting

Spleen – helps to filter out toxins in the blood

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

The Nervous System

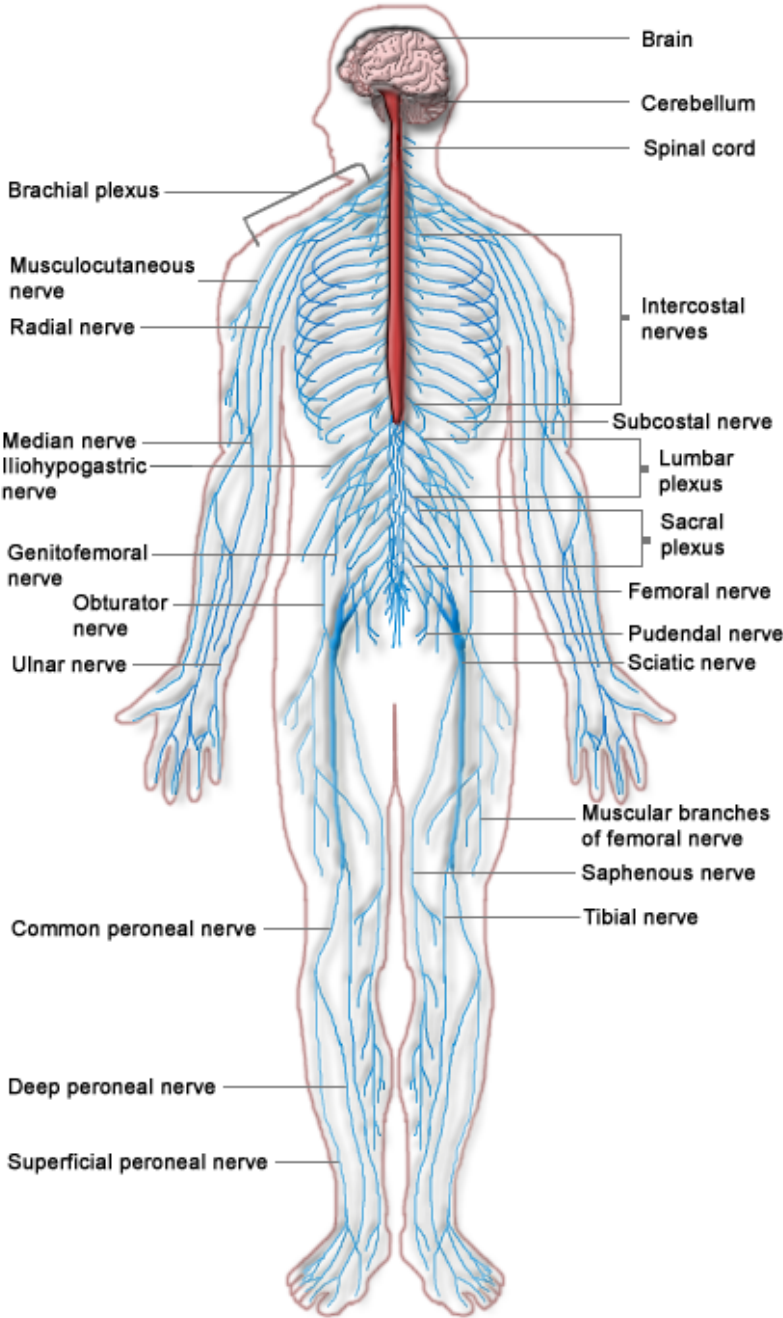
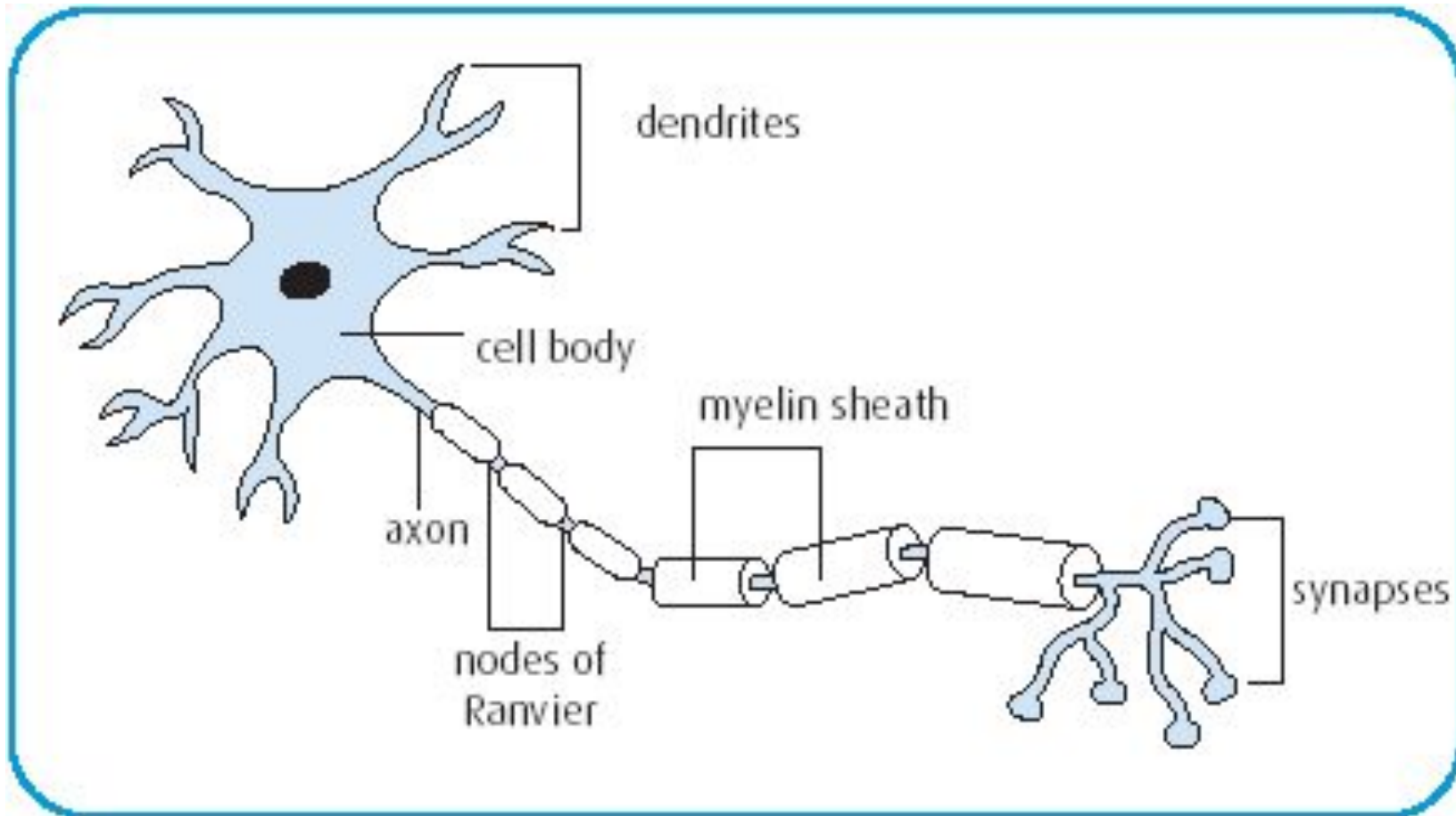


Diagram of a Nerve Cell

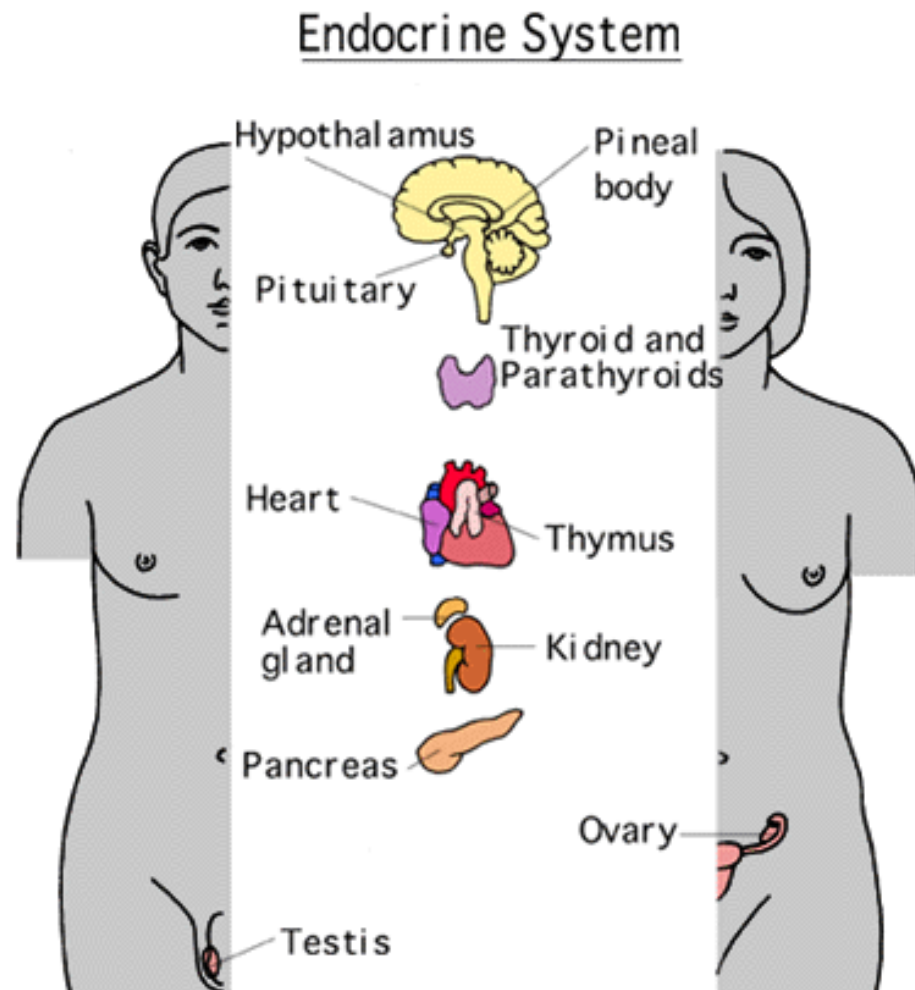


The Endocrine System

Purpose: The endocrine system influences almost every cell, organ, and function of our bodies. The endocrine system is instrumental in regulating mood (secretion of hormones), growth and development, tissue function, metabolism, and sexual function and reproductive processes.

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

THE SKELETAL SYSTEM



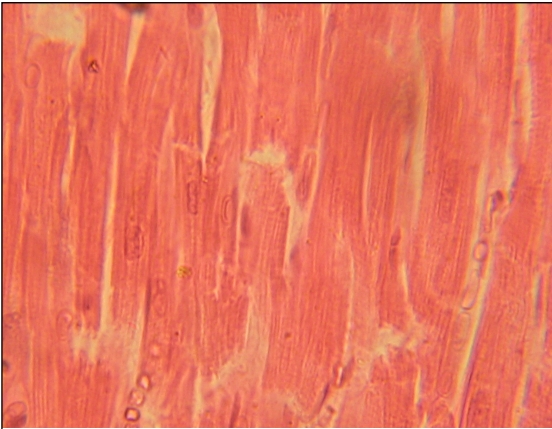
The Muscular System

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

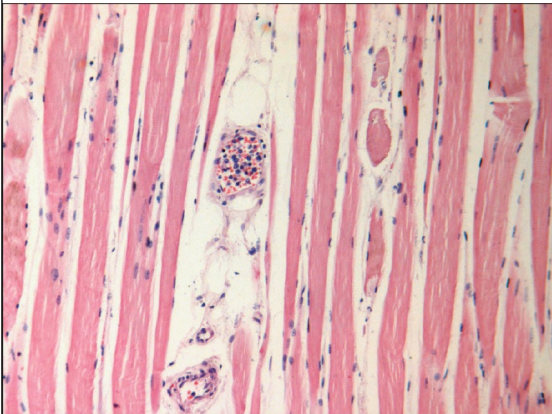
- muscle cells are fibrous
- muscle contractions can be voluntary or involuntary

Major Muscles in the Human Body

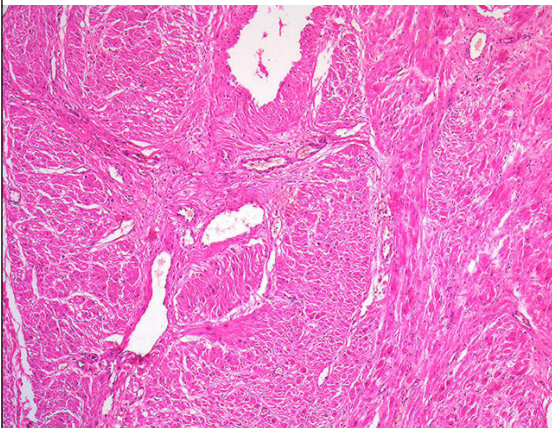
- biceps
- triceps
- deltoids
- glutes
- hamstrings



Cardiac Muscle



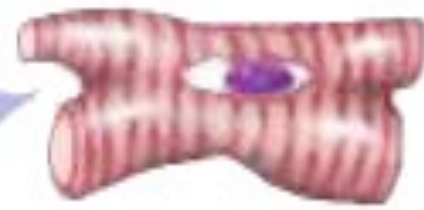
Skeletal Muscle



Smooth Muscle

The human body has three types of muscles: cardiac, skeletal, and smooth.

Each type has a different role that it plays in the body.



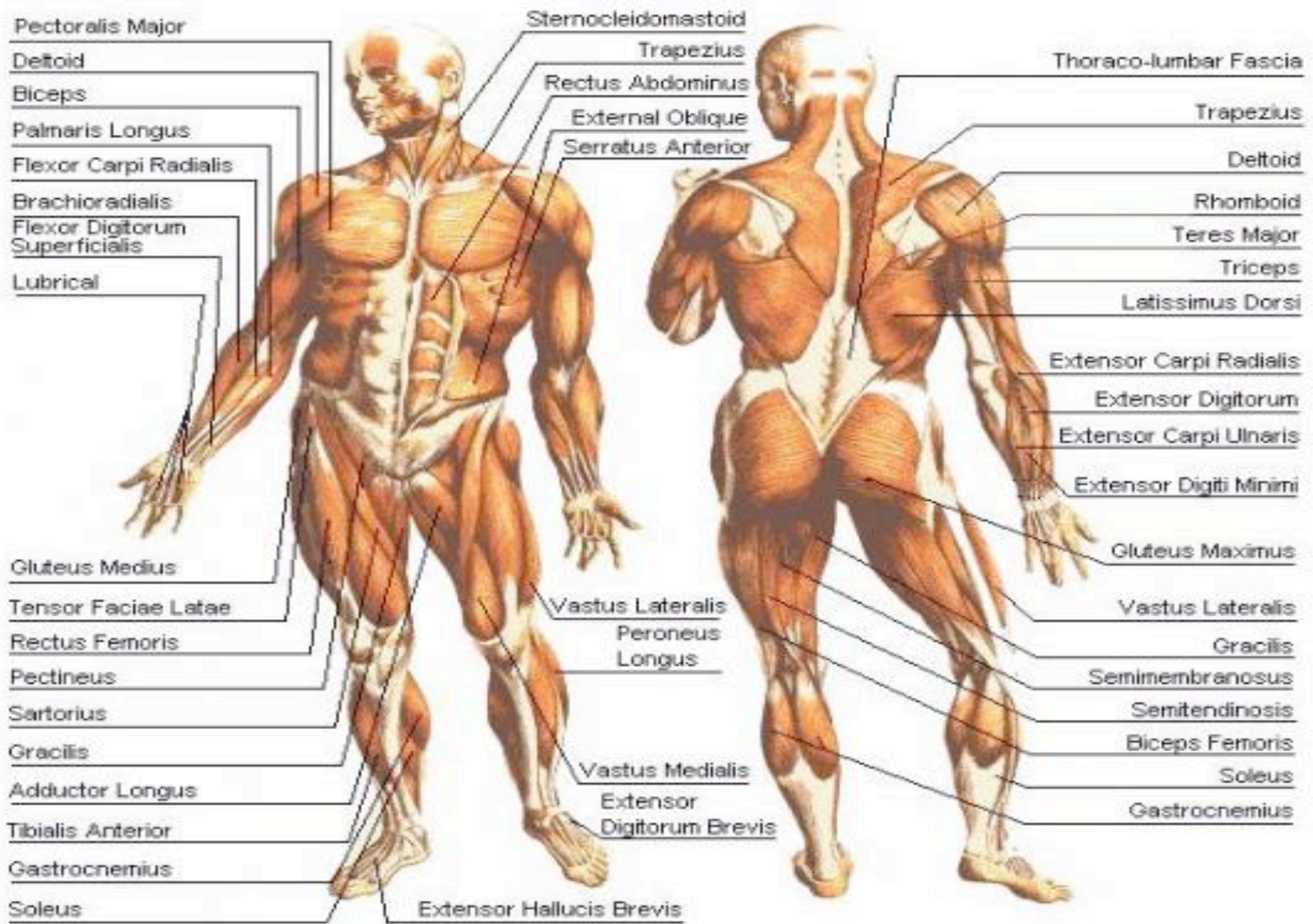
Cardiac muscle cell



Skeletal muscle cell



Smooth muscle cell



Anterior

Posterior

The Lymphatic (Immune) System

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

Major Organs and Their Functions:

Skin (hair, nails) – also called the **INTEGUMENTARY SYSTEM**, the skin is the body's first line of defense.

1. Prevent water loss
2. Protect body from injury and infection
3. Helps regulate body temperature
4. Eliminates waste in the form of sweat or perspiration
5. Receives information from the environment (heat, pain, and pressure)
6. Uses sunlight to produce vitamin D

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

