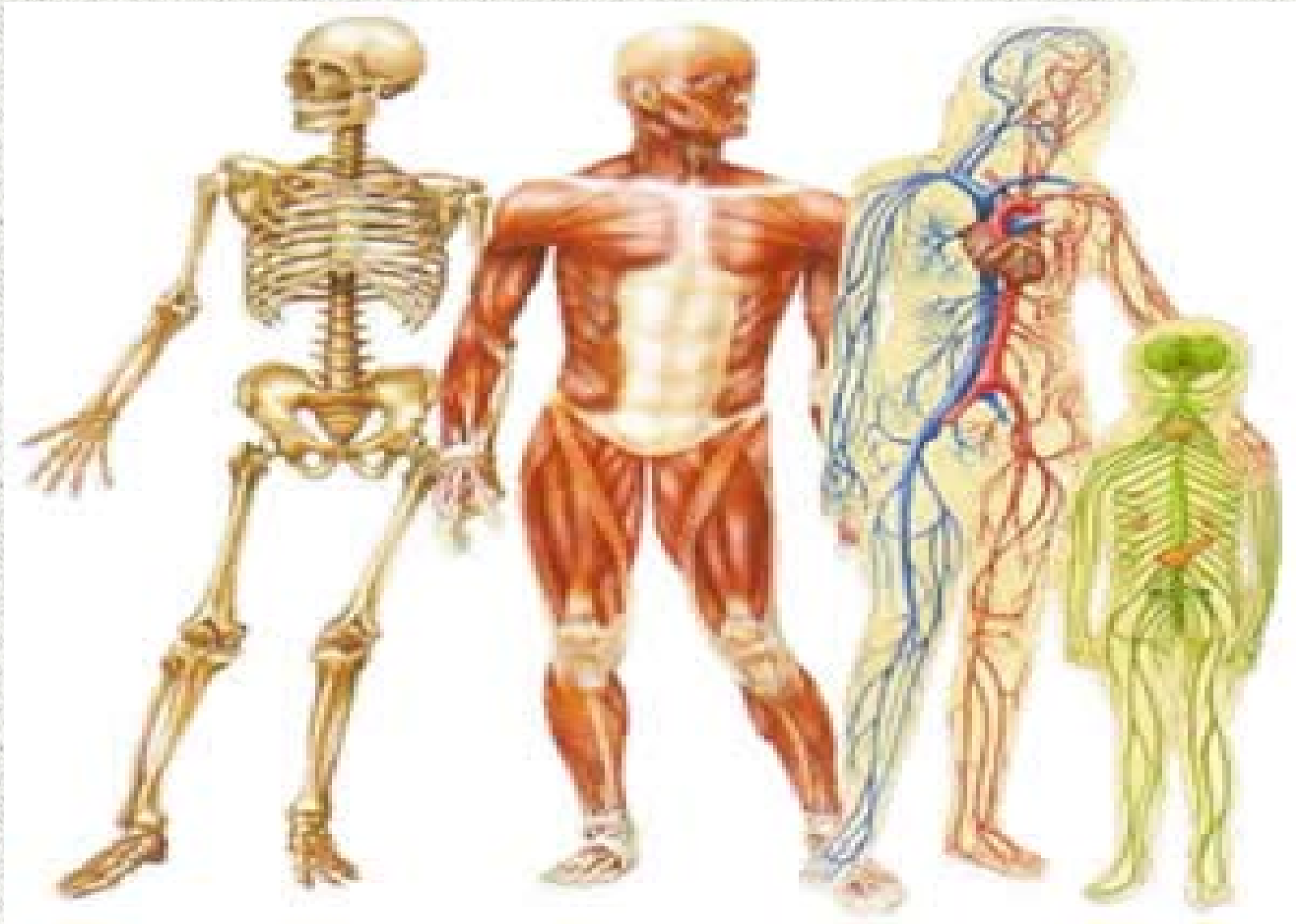


Human Anatomy and Body Systems



Levels of Organization

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

– the basic unit of life

– clusters of cells performing a similar function

– made of tissues that perform one specific function

– 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

The 11 Human Body Systems

The 11 human body systems are as follows:

-- nervous

-- respiratory

-- excretory

-- muscular

-- endocrine

-- lymphatic (immune)

-- integumentary

-- digestive

-- skeletal

-- circulatory

-- reproductive

The Digestive System

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

Major Organs and their Functions:

- to chew and grind up food

-- saliva also begins the chemical breakdown

- pipe connecting mouth to 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

- produces the hormone **insulin** that regulates **blood sugar levels**

-- also help neutralize stomach acid

produces **bile**, which breaks down **fats in foods**

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

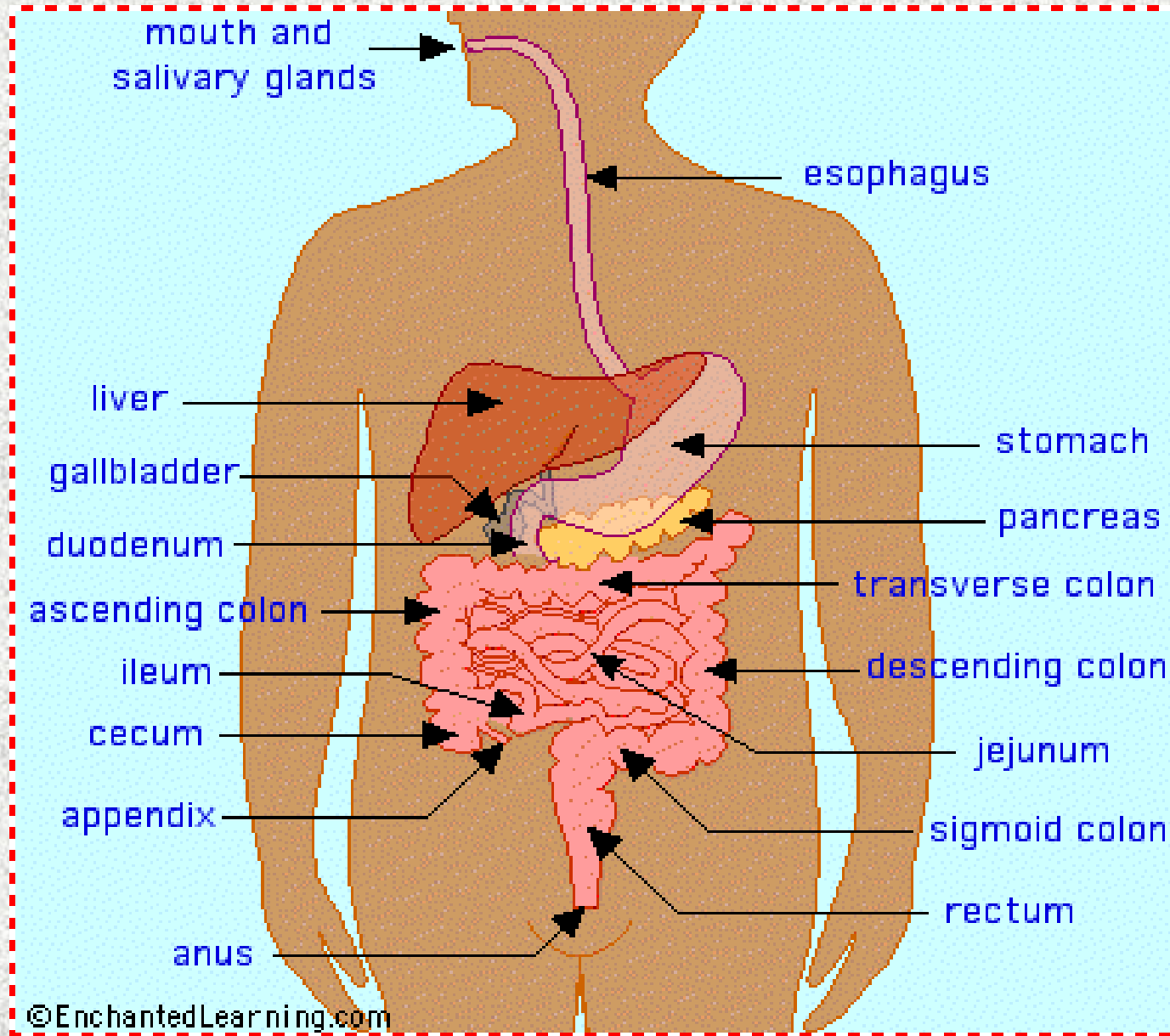
– after digestion is complete, the chyme enters the small intestine where it is **absorbed into the bloodstream**

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

- removes **water from the chyme** and gets the waste ready for **egestion**.

Image of the Digestive System

Click
the
picture



The Excretory System

Purpose: to rid the body of wastes, including excess water and salts (metabolic or cellular waste)

Major Organs and Their Functions

 – 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**

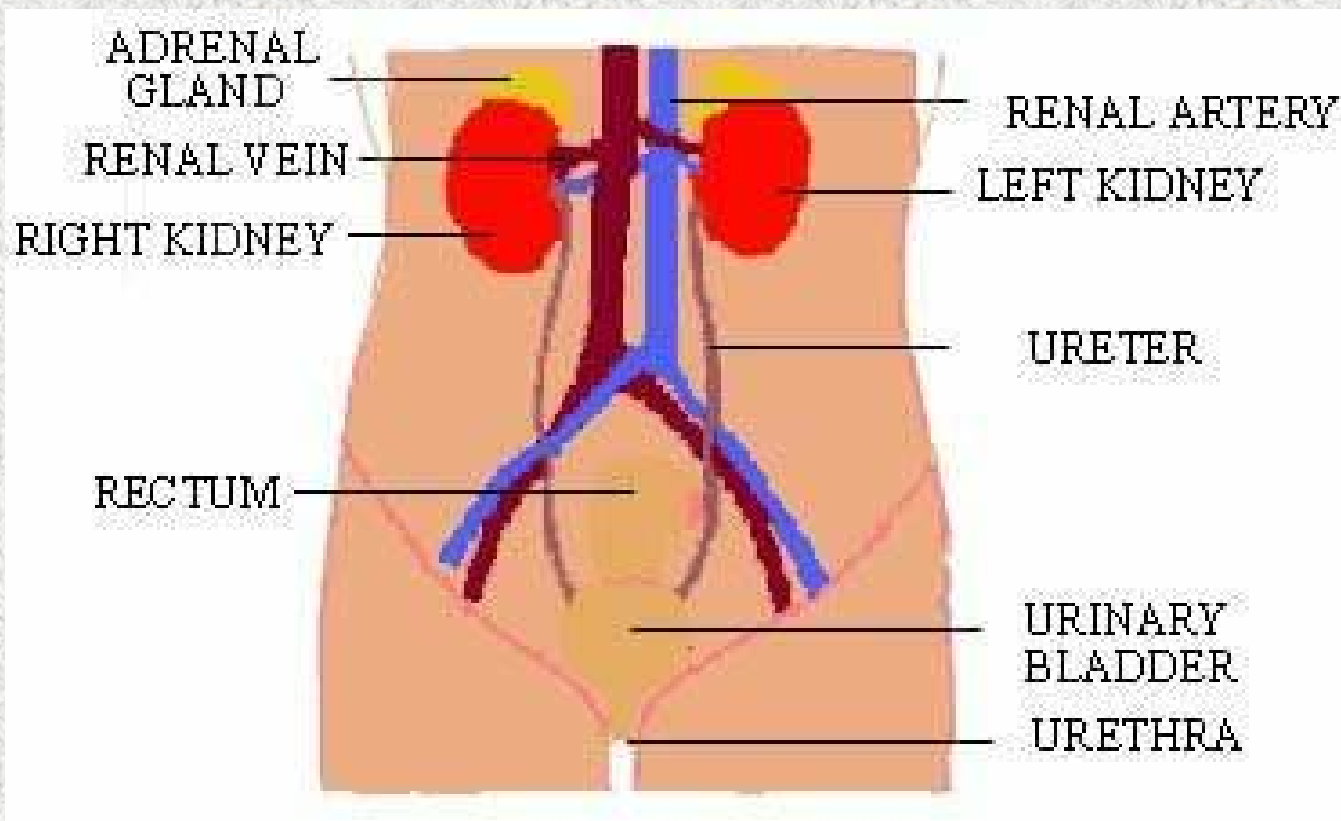
-- eventually they travel through the **ureter** to the **urinary bladder**

Nephron - functional unit of the **kidney**, the structure that actually produces **urine** in the process of removing waste and excess substances from the blood

sweat glands remove **excess water and salts** from the body

– expel the waste gas **carbon dioxide**

Image of 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

internal entry and exit point for air

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

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

– 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

– 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**

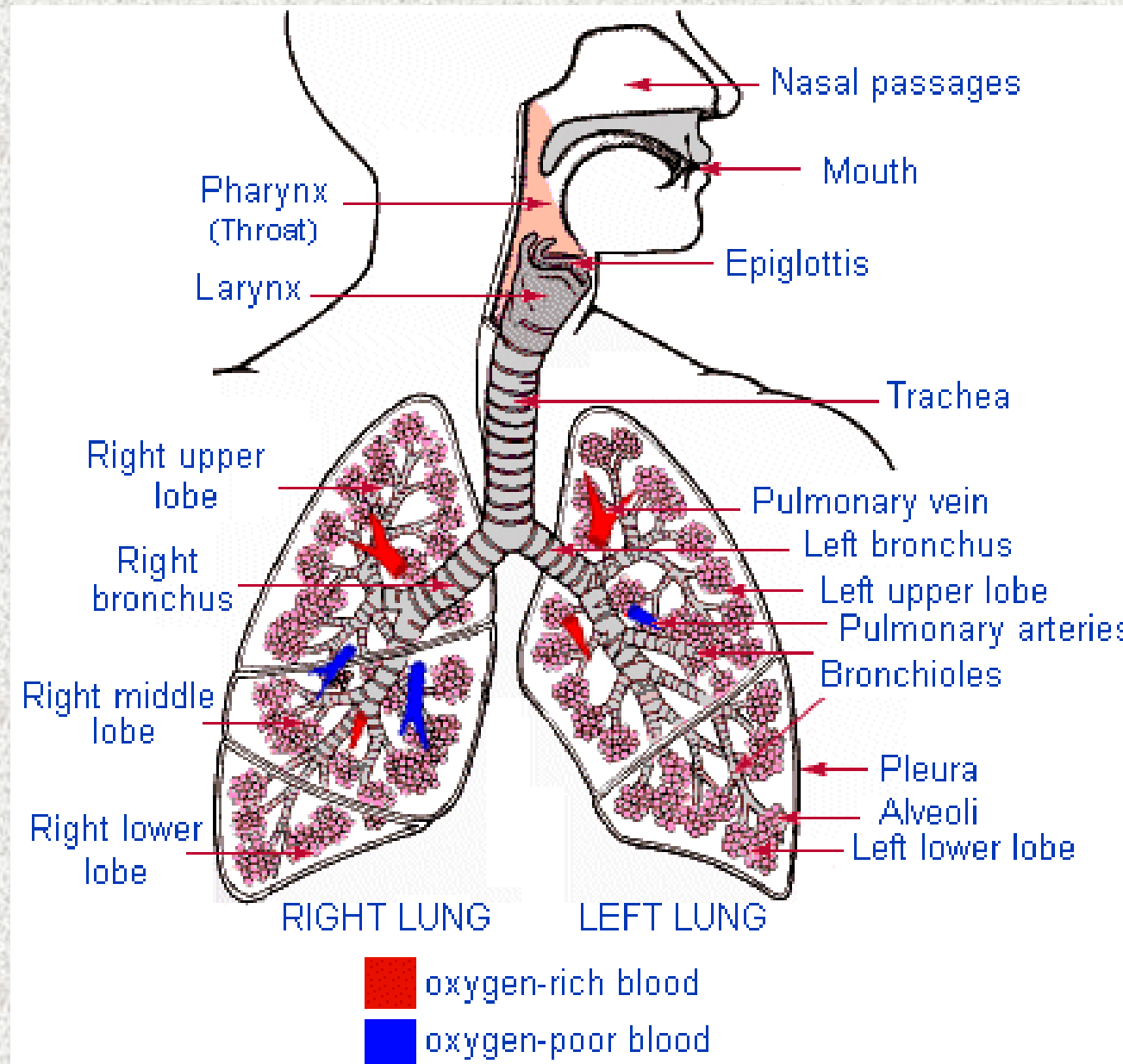
-- alveoli are in clusters, like grapes

-- 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

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

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

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

– small blood vessels where **gas exchange** occurs

the cells that flow through the circulatory system

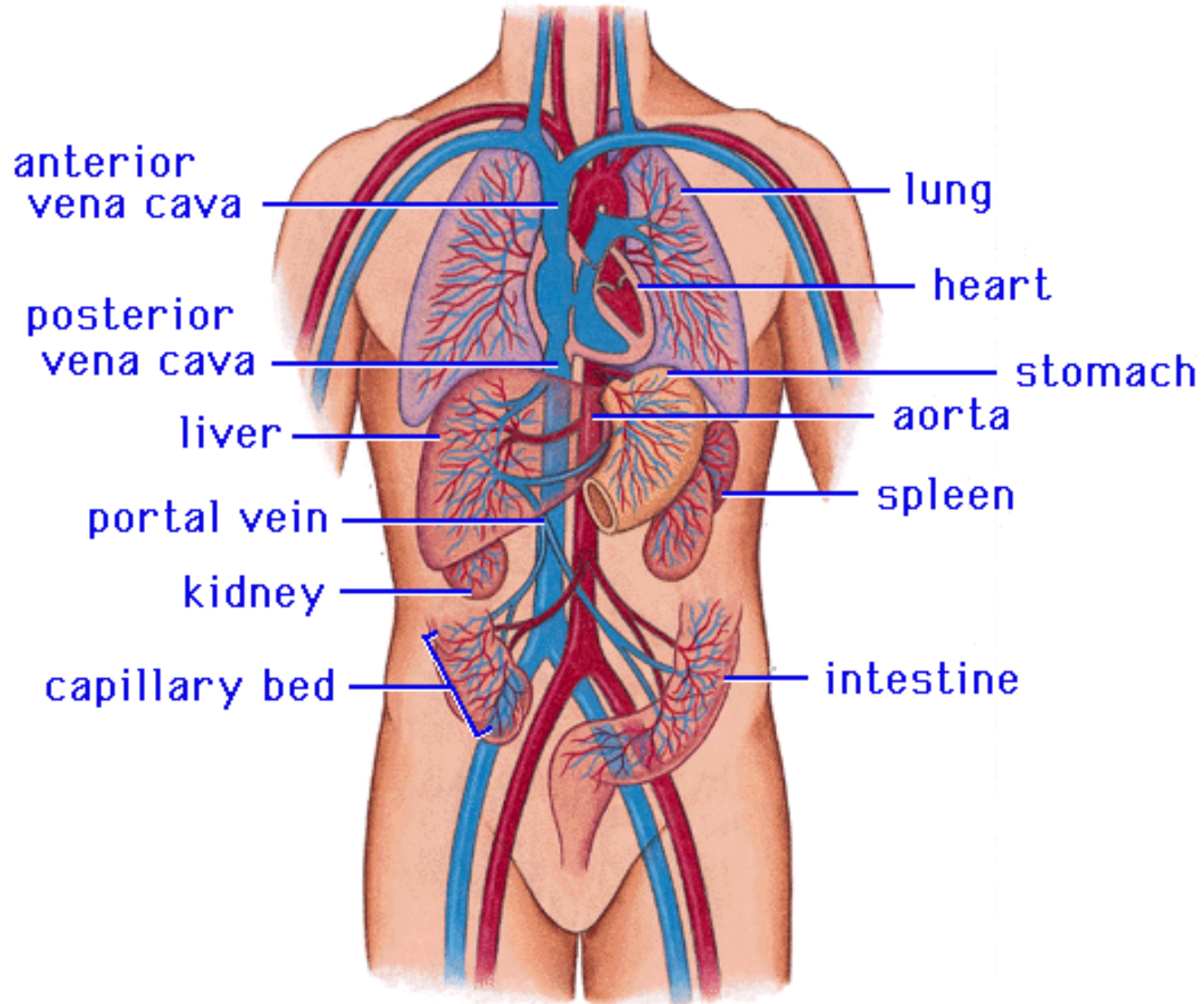
-- red blood cells contain **hemoglobin**, an iron-rich protein that carries oxygen

-- white blood cells function in the immune system

-- platelets help in **blood clotting**

– 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

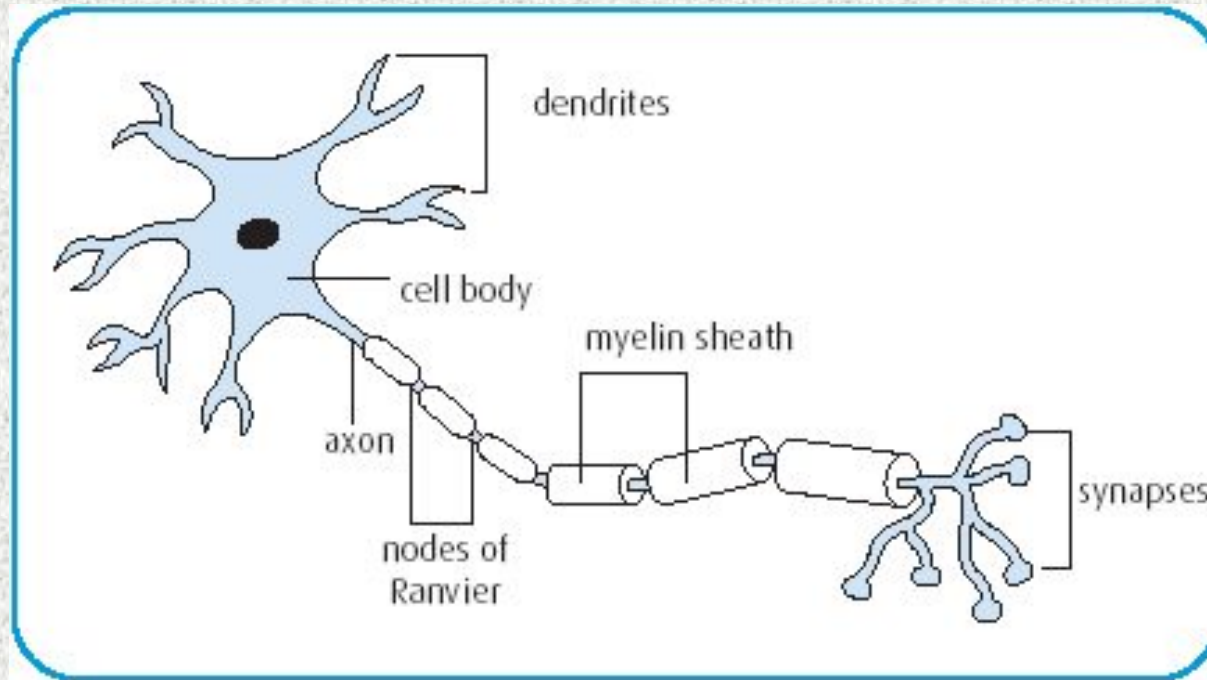
-- consists of **cerebrum** (controls **thoughts and senses**) and **cerebellum** (controls **motor functions**)

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



<https://www.youtube.com/watch?v=n6iOUW523BE>

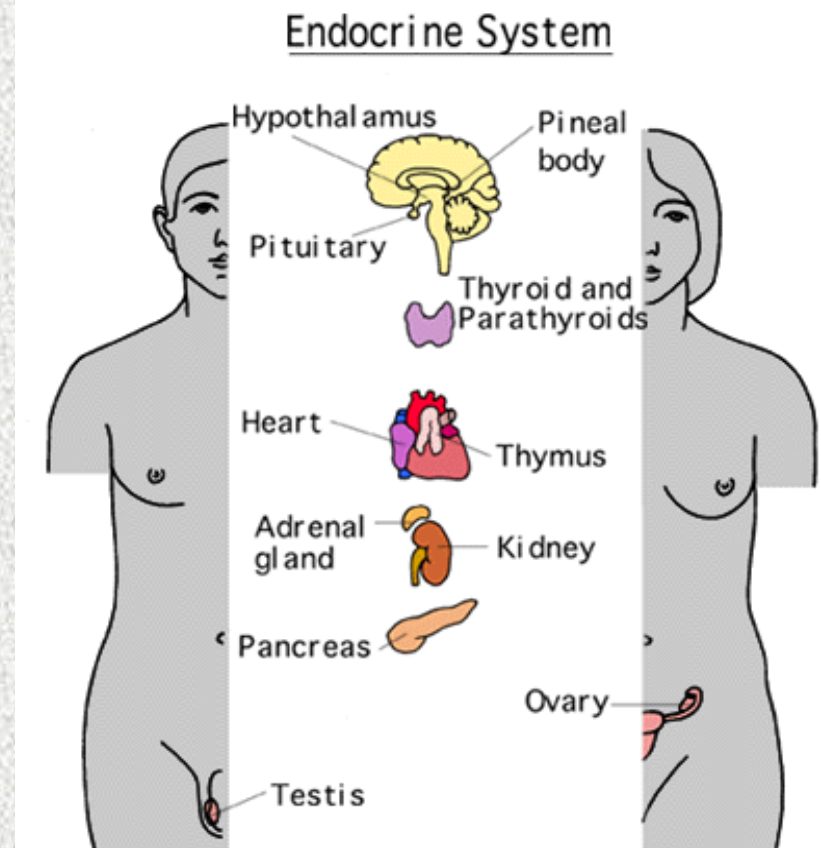
The Endocrine System

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

Hormones: chemicals (many are proteins) produced naturally by the body that **regulate** physiological processes

Major Organs

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

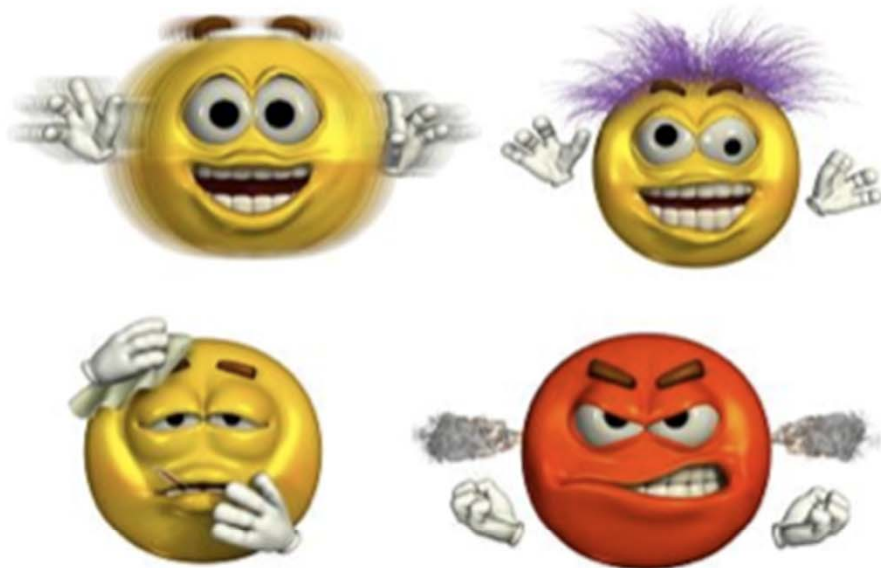


Balancing Hormones

Balancing hormones is important because hormones are used in every cell in the body.

The balance of hormones in the body plays an important role in your physical and psychological conditions.

When your hormones are not balanced, you will easily feel more emotional and also very sensitive in physical terms.



The Pituitary Gland

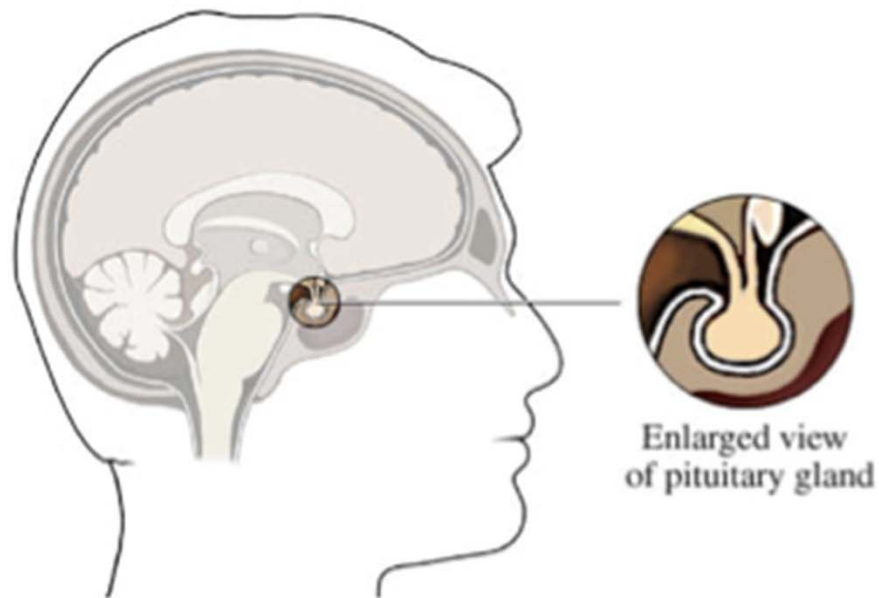
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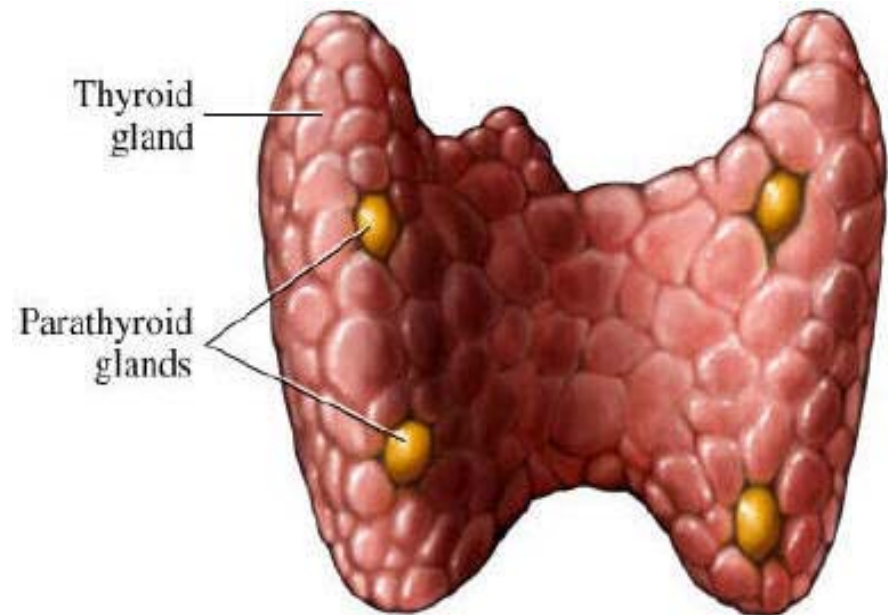
Thyroid

Hormones produced:

Thyroxin

Too much

Too little

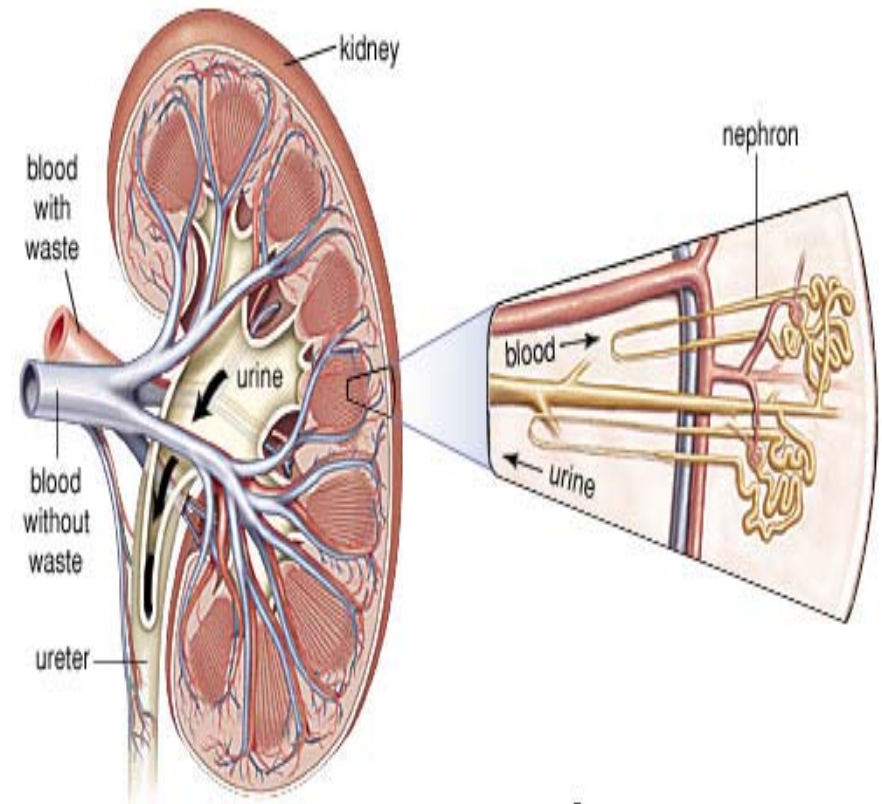


Adrenal Glands

Hormones produced:

Adrenaline & Noradrenalin

Cortisol



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The **nephron** is the basic structural and functional unit of the kidney. Its chief function is to regulate the concentration of water and soluble substances like sodium salts by filtering the blood, reabsorbing what is needed and excreting the rest as urine.

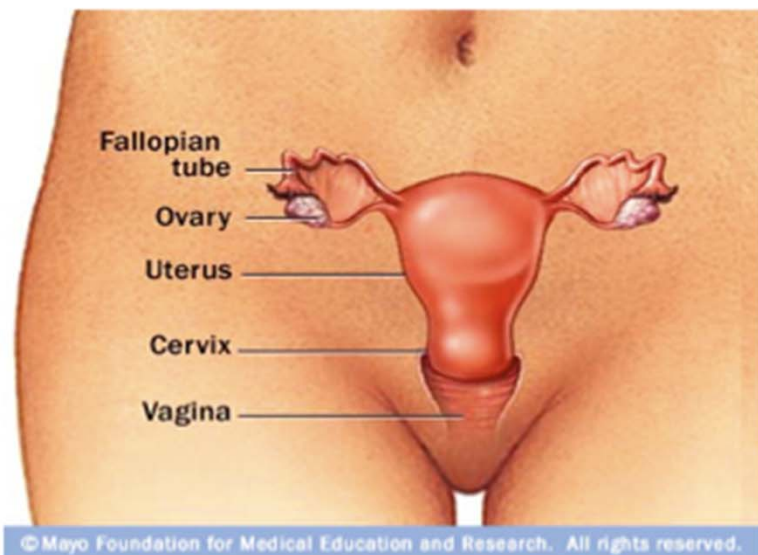
Ovaries

Hormones produced:

Estrogen & Progesterone

*Too little

*Too much

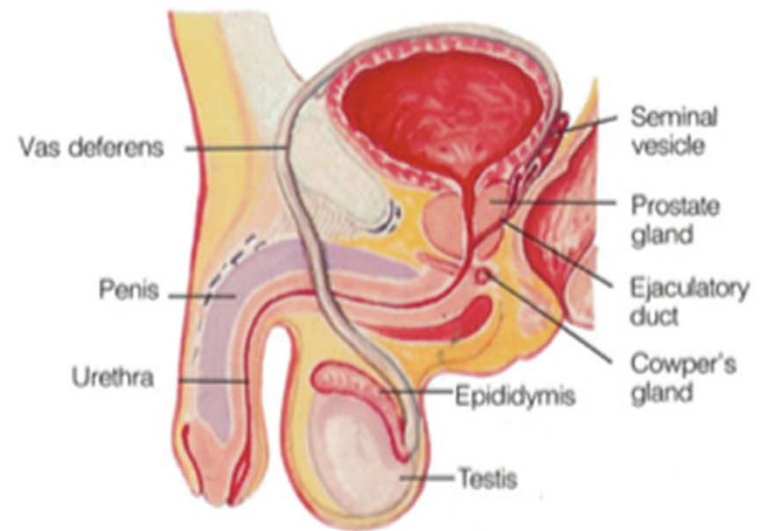


Testes

Hormone produced:

Testosterone

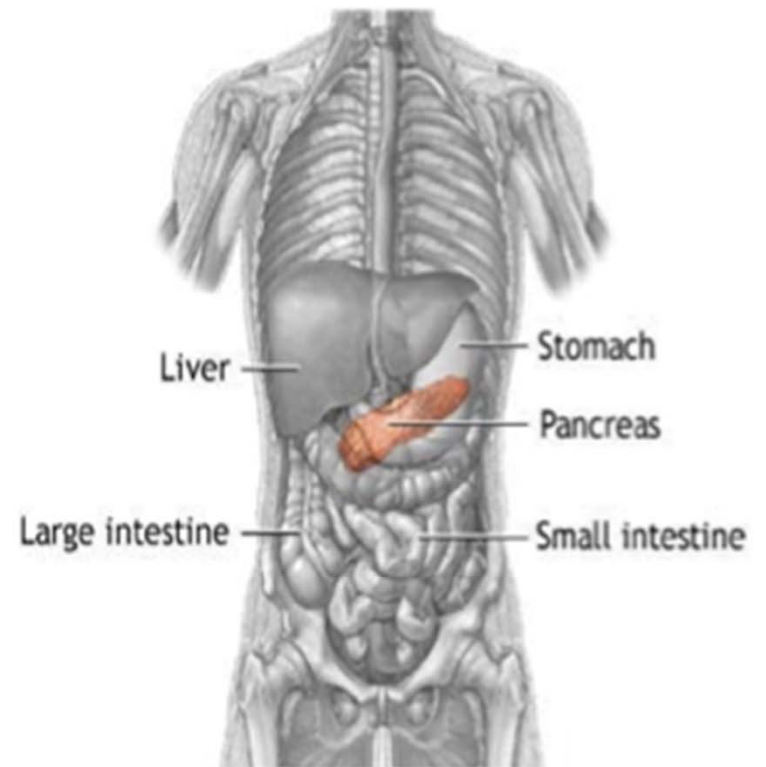
Steroids



Pancreas

Click Screen

Diabetes: chronic disease in which there are high levels of sugar in the blood



The Skeletal System

Purpose: to provide structure and support to the human body

Bone
marrow

Major

-- femur

-- radius

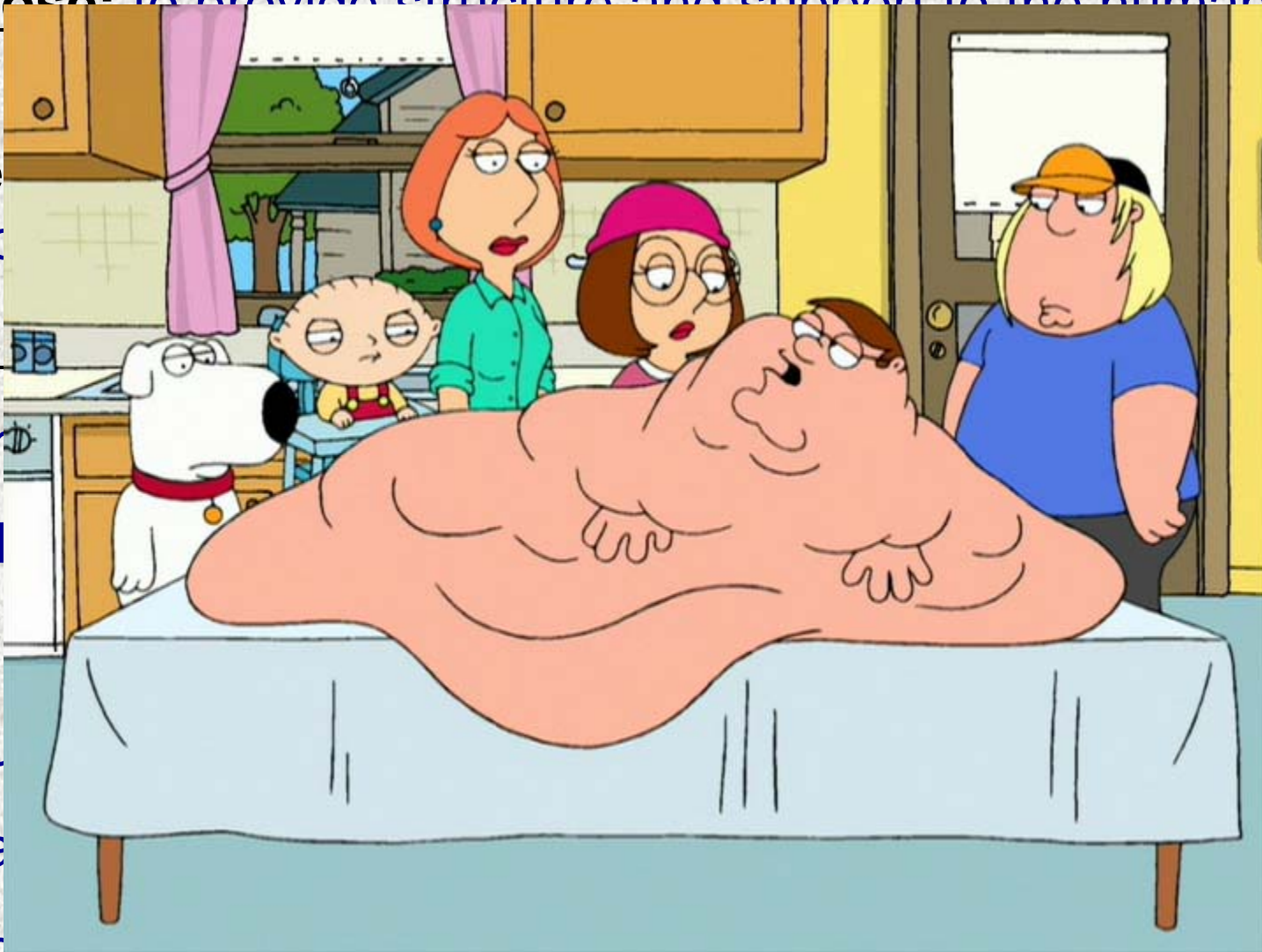
-- sternum

-- fibula

-- scapula

-- COCCYX (tail bone)

phalanges (fingers/toes)



What would you look like if you had no bones?

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
- quadriceps

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

Integumentary System (Skin)

- The skin covers and **protects the body** from abrasion, bacterial attack, ultraviolet radiation, and dehydration – Basically **Waterproof**
- It helps control **internal temperature**.
- Its vessels serve as a blood reservoir for the body.
- The skin produces vitamin D required for calcium metabolism.
- Its **receptors** are essential in **detecting environmental stimuli**.

Vertebrate Skin

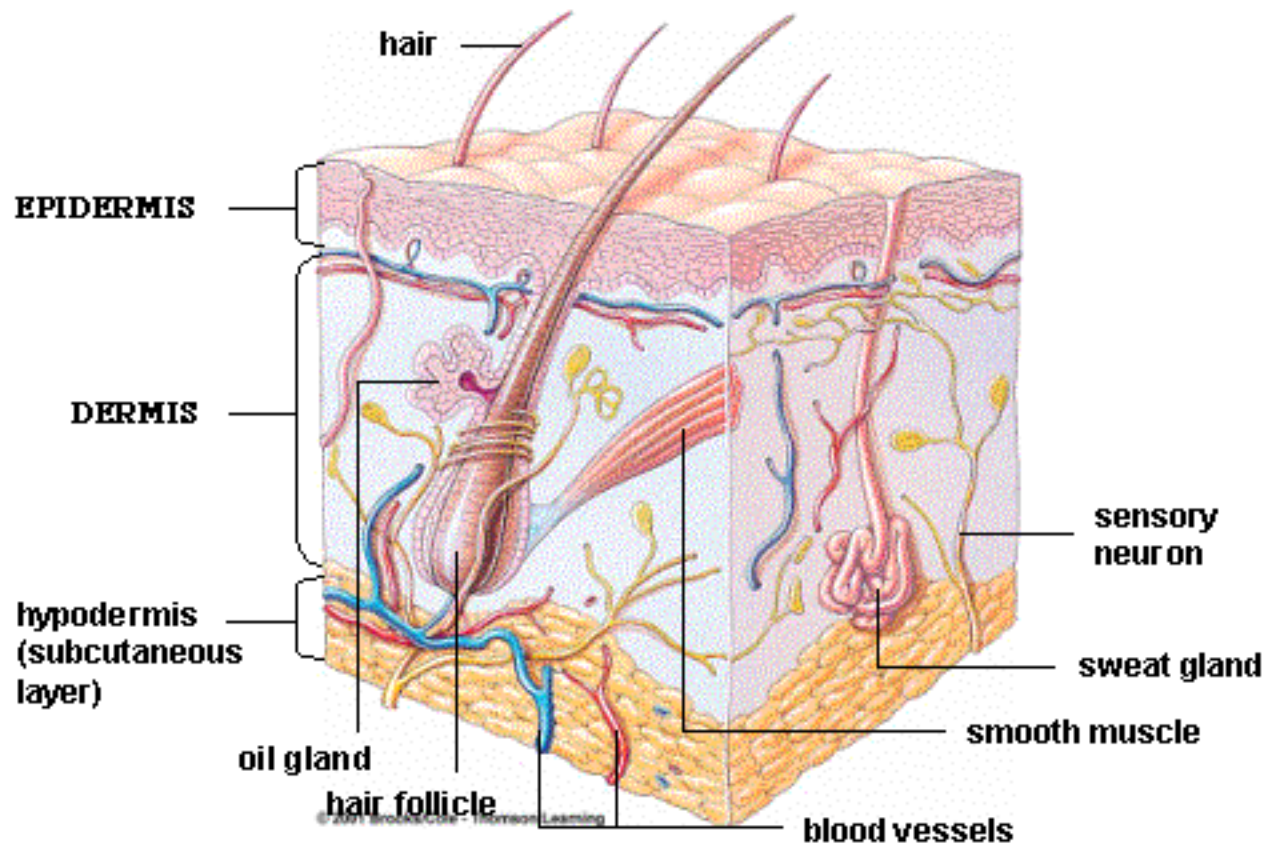
Two layers

Upper epidermis

Lower dermis

Lies atop a layer of hypodermis

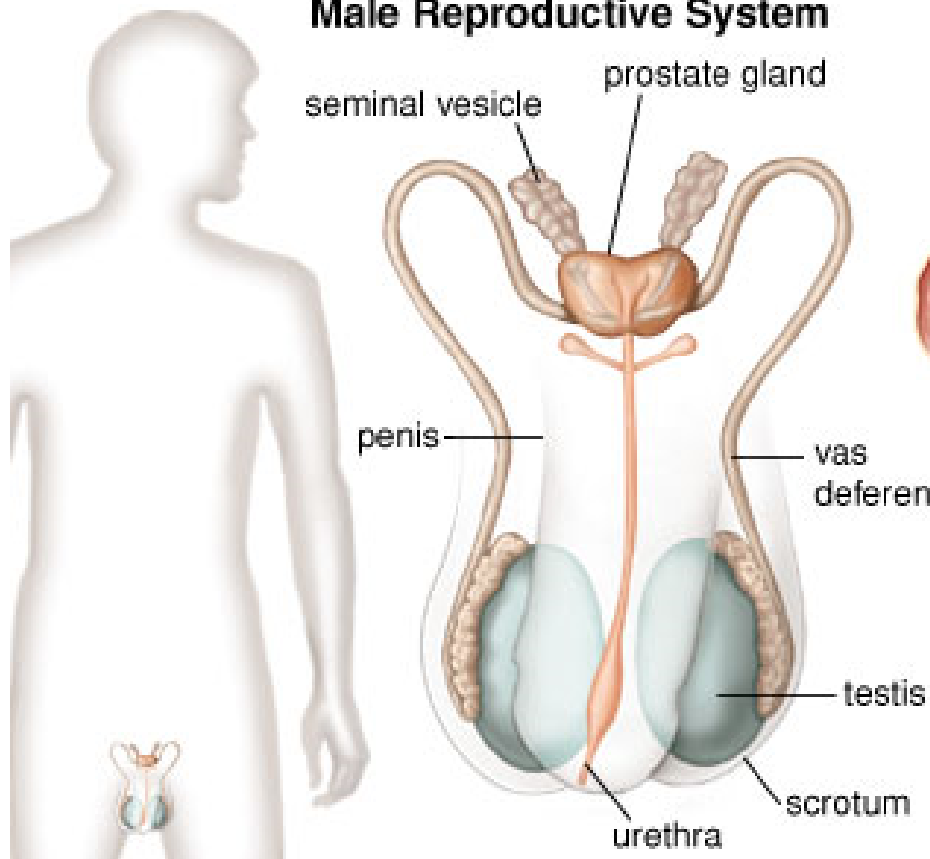
<https://www.youtube.com/watch?v=iuYxGtuBSgk>



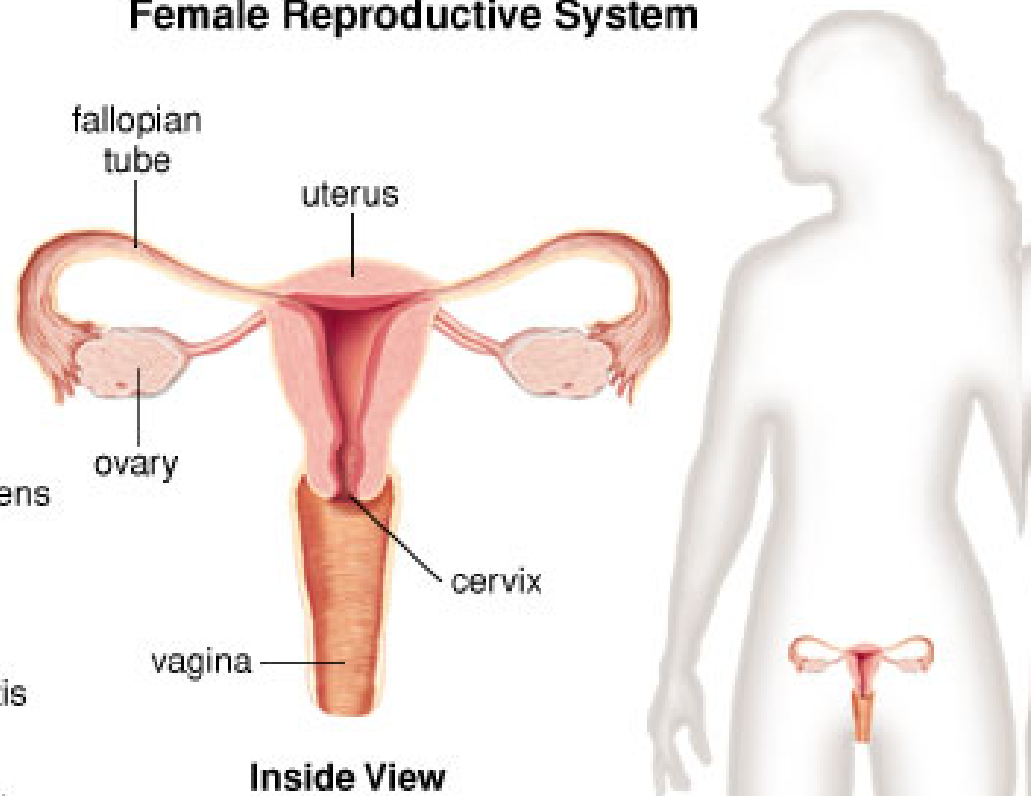
Reproductive System

- The male and female reproductive systems are very different in function.
- The male reproductive tract includes structures devoted to producing and storing sperm, synthesizing accessory fluids, or transporting and delivering semen.
- The female reproductive tract includes structures devoted to receiving sperm, producing eggs, or nourishing and delivering offspring

Male Reproductive System



Female Reproductive System



Feedback Mechanisms

Positive Feedback – Change prompts a response, which leads to a greater change and a greater response.

(Ex.) Blood clotting - Once a vessel is damaged, platelets start to cling to the injured site and release chemicals that attract more platelets. The platelets continue to pile up and release chemicals until a clot is formed.

(Ex.) Child birth - During labor, a hormone called oxytocin is released that intensifies and speeds up contractions. The increase in contractions causes more oxytocin to be released and the cycle goes on until the baby is born. The birth ends the release of oxytocin and ends the positive feedback mechanism.

Negative Feedback – Change in the environment can prompt one system to send a message (ex. Hormone) to system two, which responds by attempting to restore homeostasis. Once system one detects that system two has acted, it **STOPS** signaling for further action.

(Ex.) **Home thermostat** (heating system) - The thermostat contains the receptor (thermometer) and control center. If the heating system is set at 70 degrees Fahrenheit, the heat (effector) is turned on if the temperature drops below 70 degrees Fahrenheit. After the heater heats the house to 70 degrees Fahrenheit, it shuts off effectively maintaining the ideal temperature.

(Ex.) **Blood sugar** (glucose) - When blood sugar rises, receptors in the body sense a change . In turn, the control center (pancreas) secretes insulin into the blood effectively lowering blood sugar levels. Once blood sugar levels reach homeostasis, the pancreas stops releasing insulin.