Specialized Cells, Tissues, Organs and Organ Systems

Chap 2, p. 67
Chap 9, p. 295
Chap 14, p. 468-471

How Does Your Body Respond?

Richard Haynes

1. Stack one book on top of another one.
2. Lift the two stacked books in front of you so the lowest book is about level with your shoulders. Hold the books in this position for 30 seconds. While you are performing this activity, note how your body responds. For example, how do your arms feel at the beginning and toward the end of the 30 seconds?

Think It Over

Inferring List all the parts of your body that worked together as you performed the activities in Steps 1 through 2.

I. Cell *(Review)*

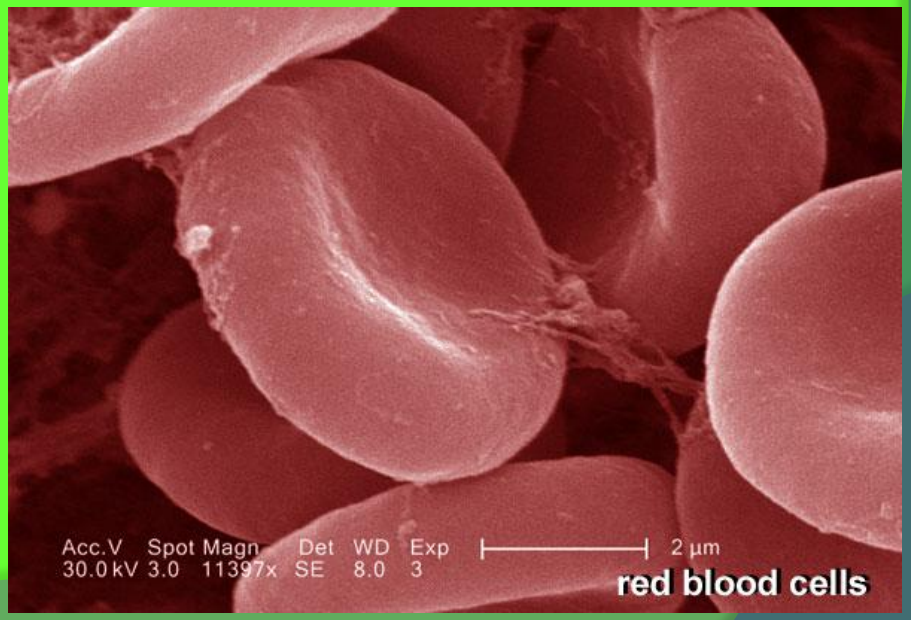
- basic unit of structure and function in a living thing. They carry out the processes that keep an organism alive.
- smallest part of the whole body organization.
- many types of cells found in the body; have different shapes and function depending on location.
- grow and reproduce; get rid of waste products that result from these activities; respond to their surroundings and use energy to perform their jobs.

Specialized Cells

- Plants and animals (including yourself) contain many cells. In a many-celled organism, the cells are often quite different from each other and are specialized to perform specific functions.

<u>Cells</u> Tissues Organs Organ Systems

- For example, nerve **cells** are specialized to transmit information from one part of your body to another, and red blood cells carry oxygen throughout your body.

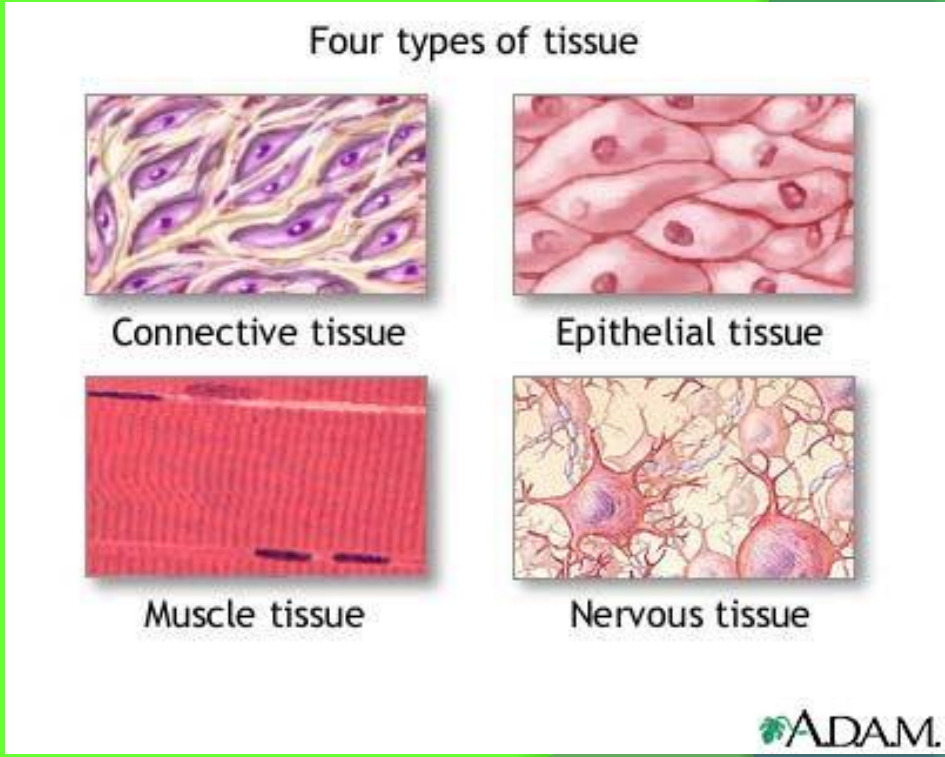


In many-celled organisms, cells are often organized into higher levels of structure including tissues, organs, and organ systems.

Cells **Tissues** Organs Organ Systems

The next largest unit of organization is tissues.

A tissue is a group of similar cells that work together to perform a specific function. For example, your brain is made mostly of nervous tissue, which consists of nerve cells.



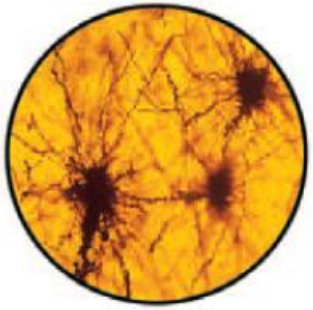
Each tissue type has a specific job based on where it is located in the body.

Human Body contains 4 basic types of tissues

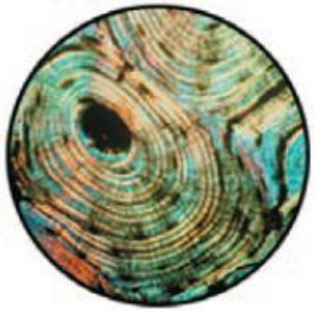
1. **Muscle** – contract or shorten so your body can move.
2. **Nervous** –carries electrical messages from the brain to other parts of the body. This controls the movement of muscles
3. **Connective** – provides support for the body and connects all parts such as bone to bone, muscle to bone, all the tissue in joints of the skeletal system and other areas.
4. **Epithelial** – (skin) protects delicate structures that lie beneath from all the elements around you. There are different shapes to the epithelial cells, therefore, they behave differently depending where in the body they are located.

Muscle Tissue
Every movement you make depends on muscle tissue. The muscle tissue shown here allows your body to move.

Nervous Tissue
Nervous tissue, such as the brain cells shown here, enables you to see, hear, and think.



Connective Tissue
Connective tissue, such as the bone shown here, connects and supports parts of your body.



Epithelial Tissue
Epithelial tissue, such as the skin cells shown here, covers the surfaces of your body and lines your internal organs.

Cells Tissues **Organs** Organ Systems

Tissues may combine to form an organ.

An organ is made of different kinds of tissues that function together to perform a specific job, such as your brain . In addition to nervous tissue, the brain contains other kinds of tissue that support and protect it.

More complex functions

Organs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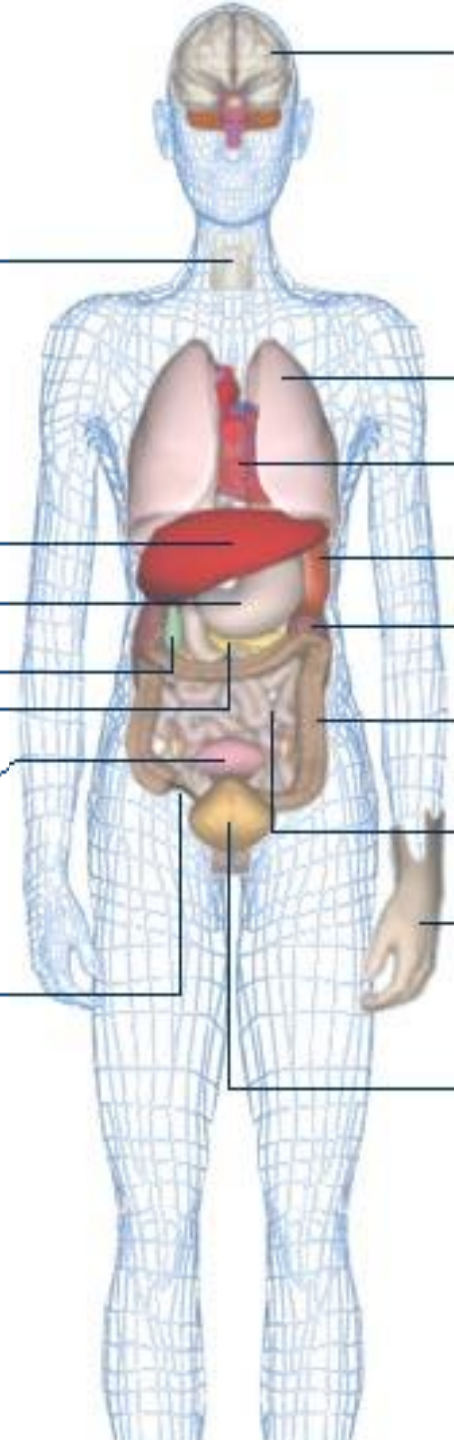
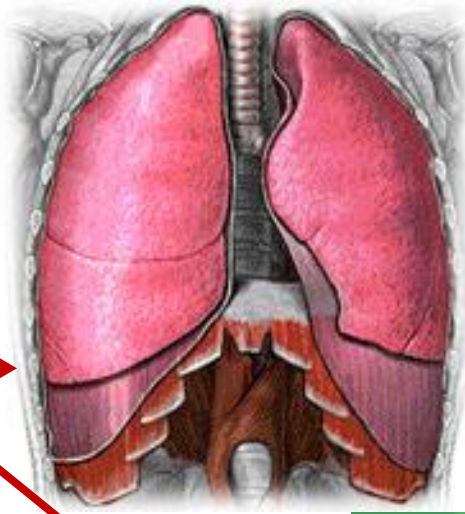
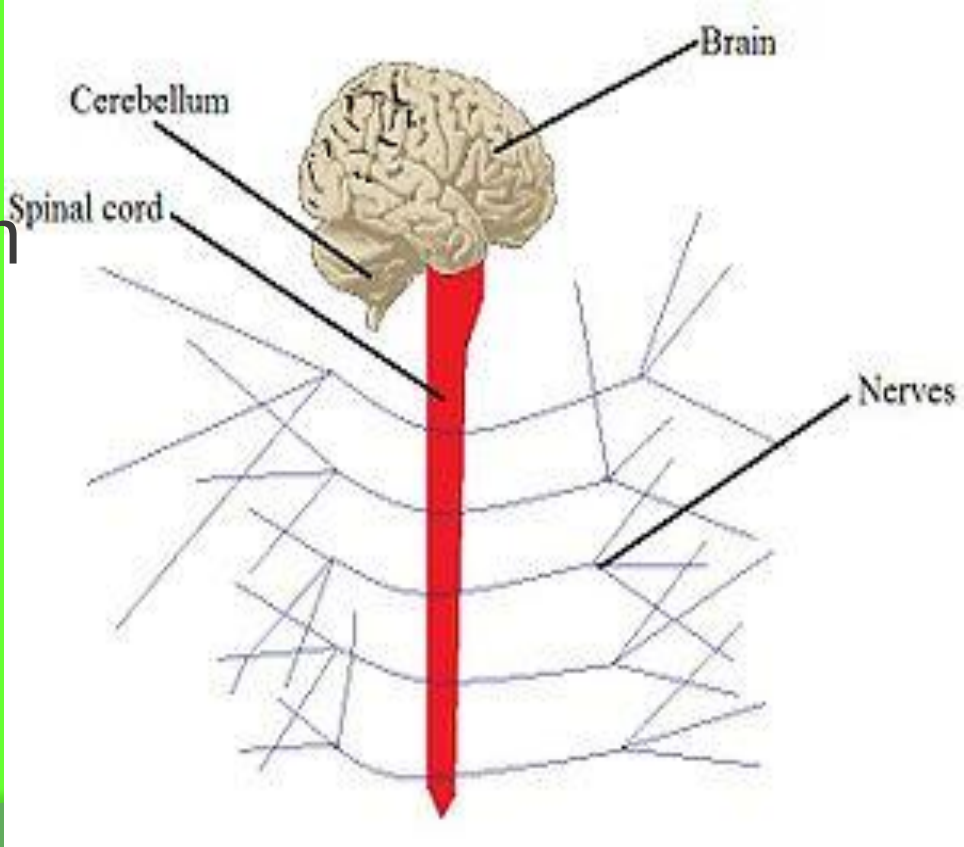

Brain
Voice box
Lungs
Heart
Liver
Spleen
Stomach
Kidneys
Gallbladder
Large intestine
Pancreas
Small intestine
Female genitals
Male genitals
Skin
Appendix
Bladder



Cells → Tissues → Organs → Organ Systems

Organs form groups of structures that perform the broadest functions of an animal are systems.

An <u>organ system</u> is a group of organs that work together to perform a major function. An organ system that directs body activities and processes is your brain which is part of your nervous system.

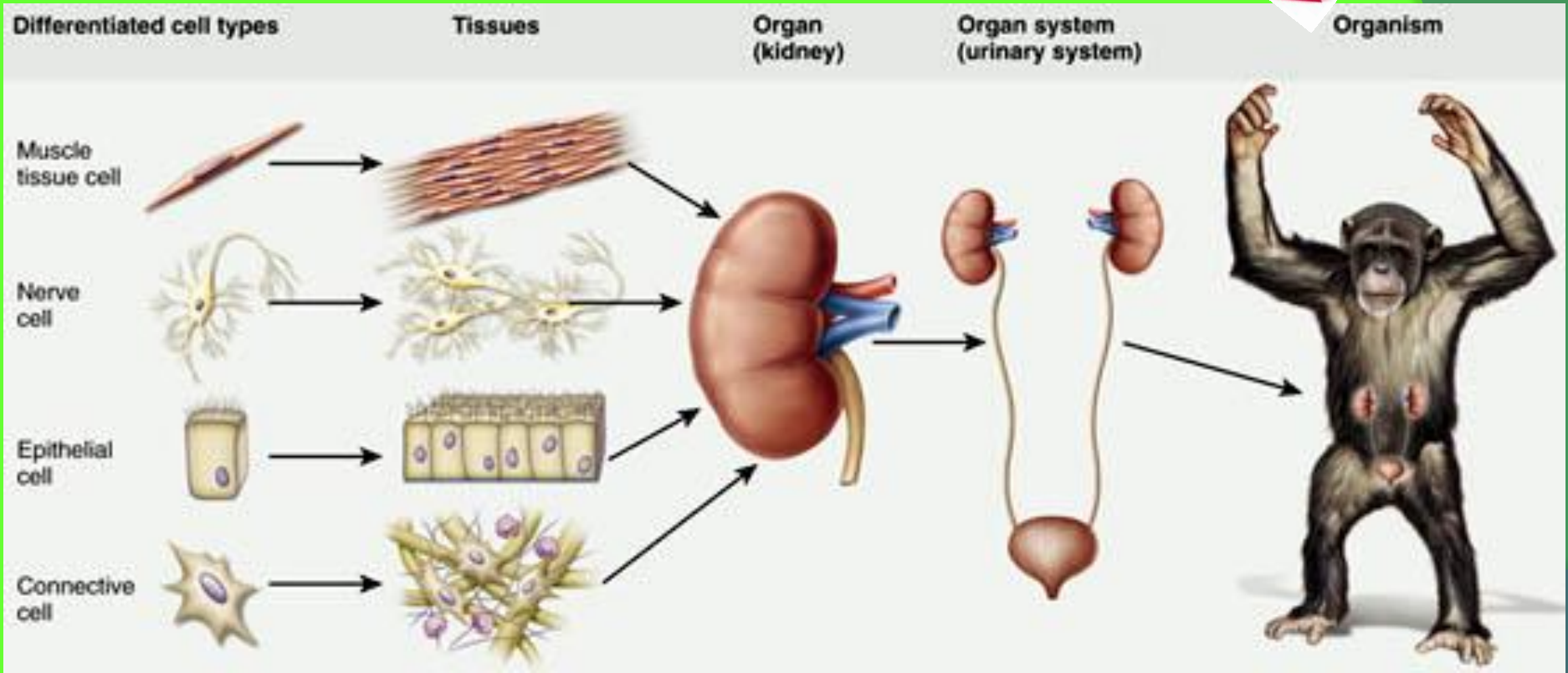


The human body has 11 systems.

Here are 8.

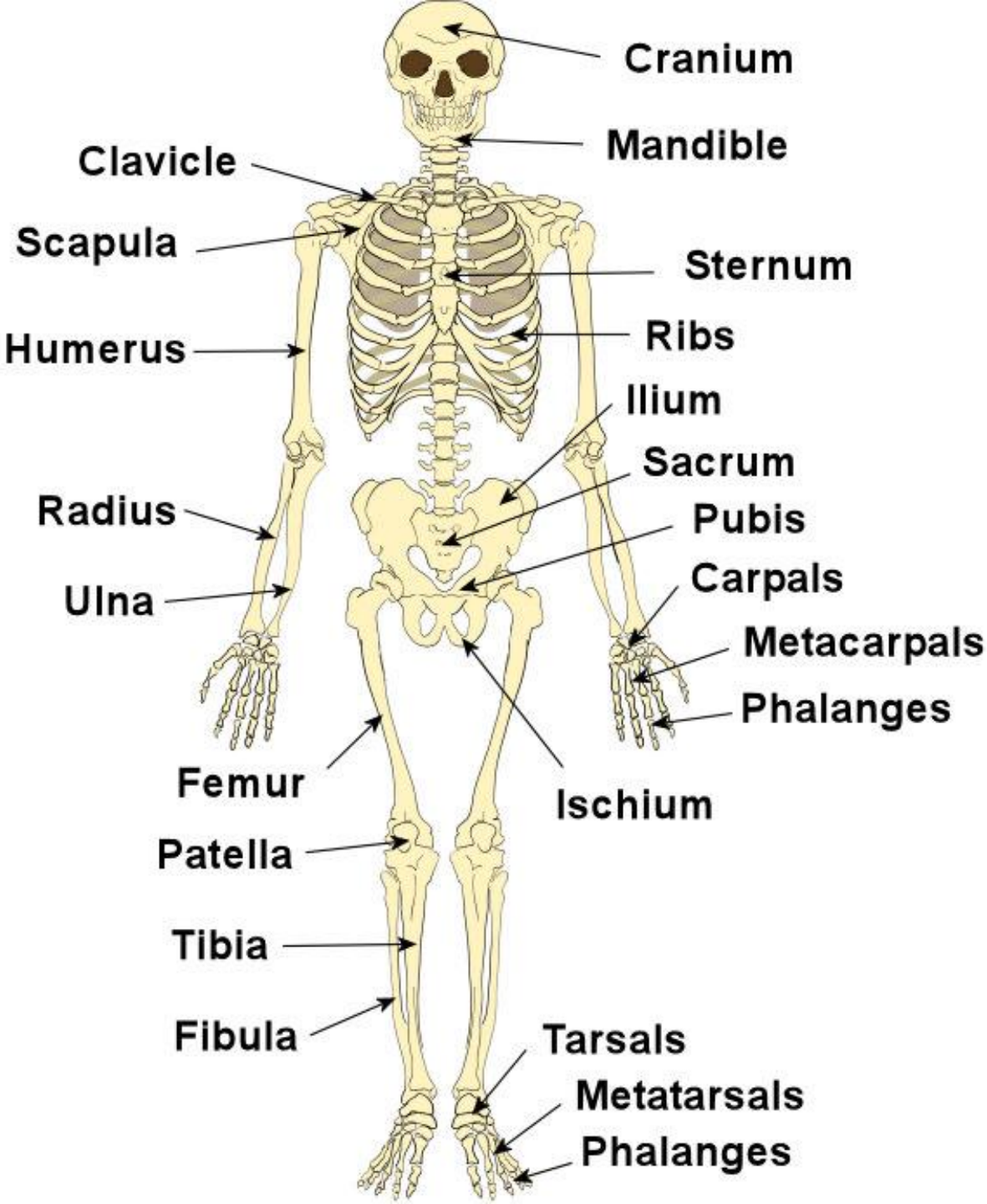
As we go through the slides fill in the table in your notes. We will concentrate on the first 3.

Cells Tissues Organs Organ Systems



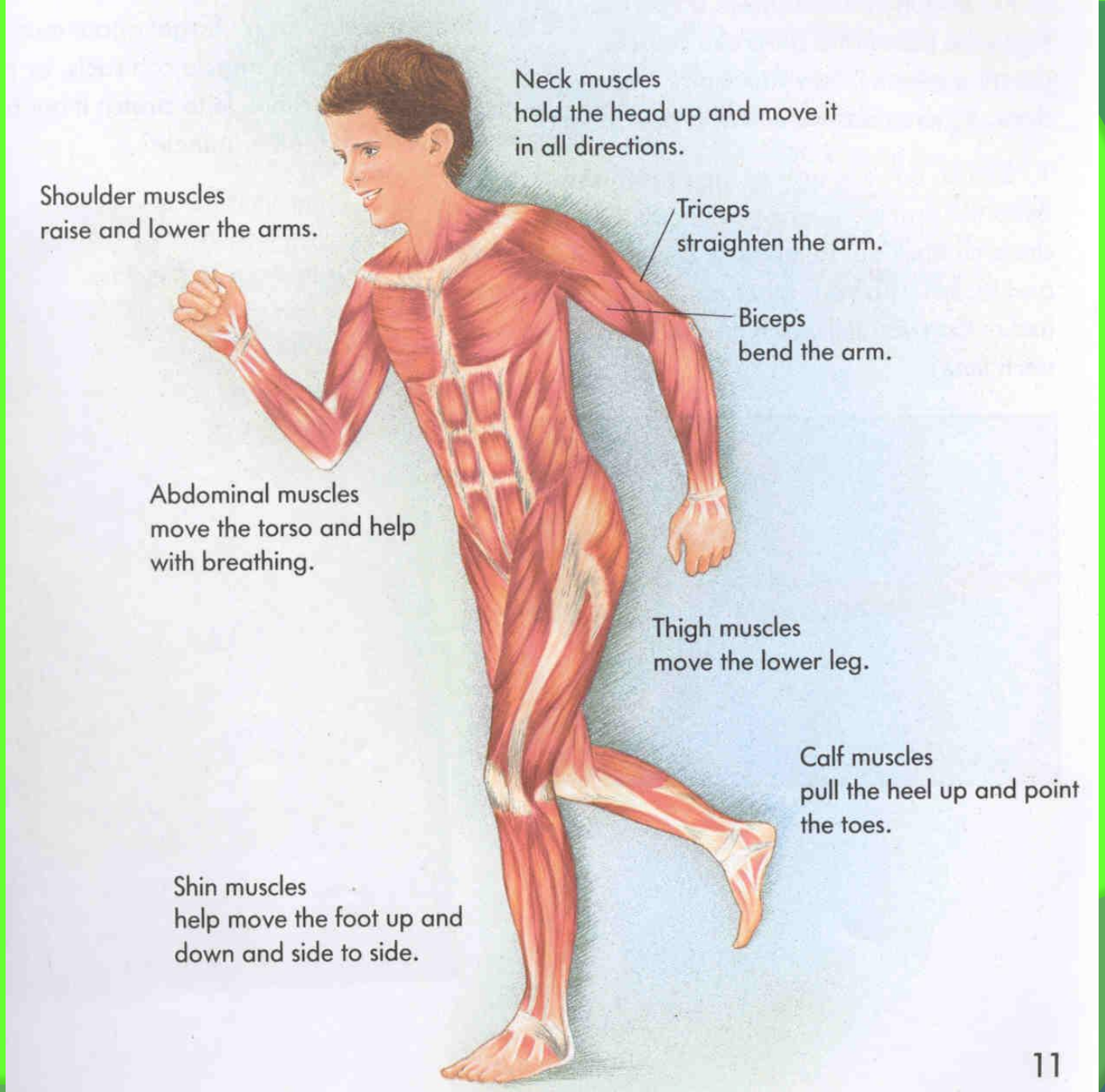
Organ Systems

- **Skeletal system** – supports and protects the body


Cranium
Mandible
Clavicle
Scapula
Sternum
Humerus
Ribs
Ilium
Sacrum
Radius
Pubis
Carpals
Ulna
Metacarpals
Phalanges
Femur
Ischium
Patella
Tibia
Fibula
Tarsals
Metatarsals
Phalanges

Organ Systems con't

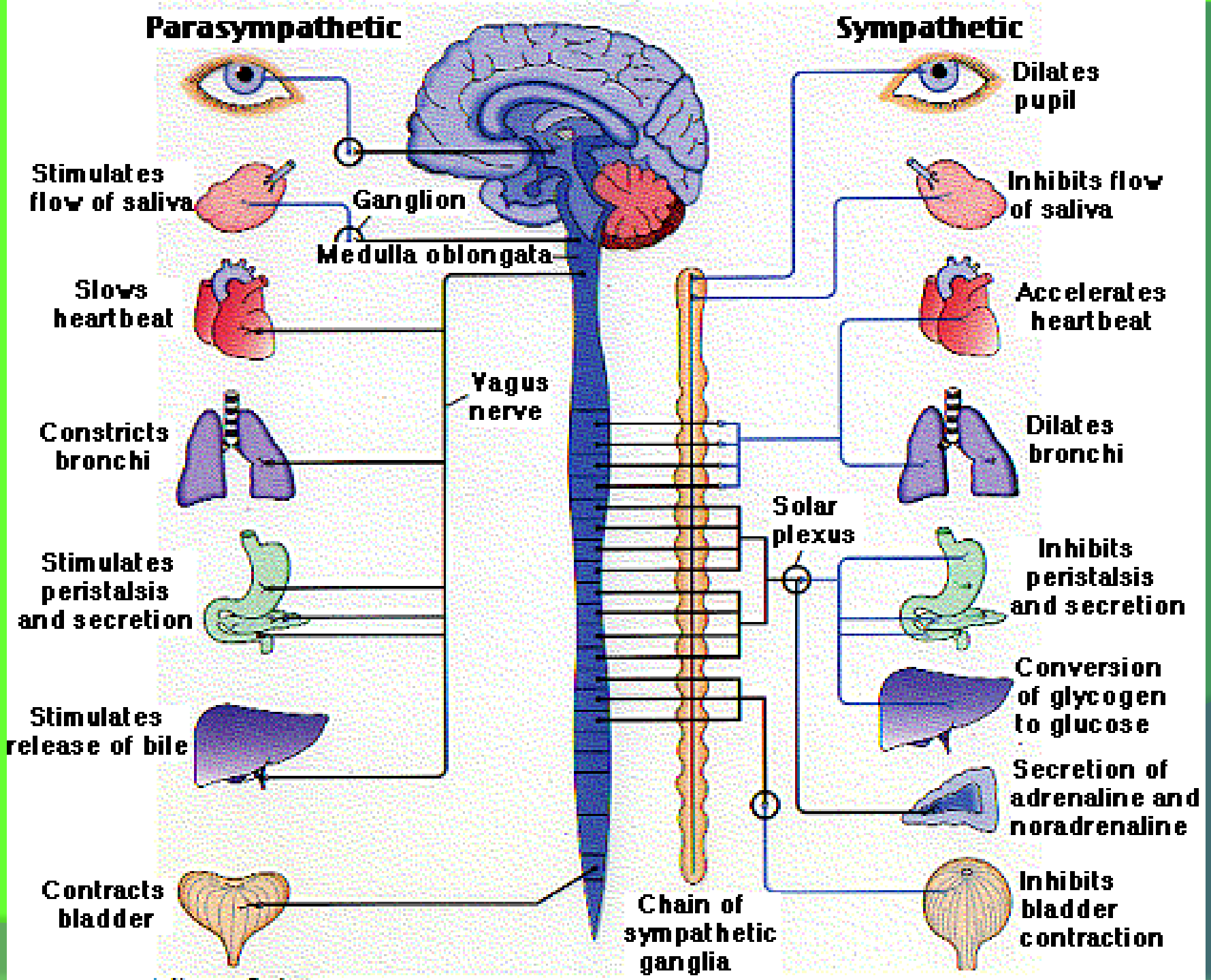
- **Muscular system** – enables movement of the body and internal organs



http://www.ehow.com/facts_5855839_muscular-system-interact-with_.html

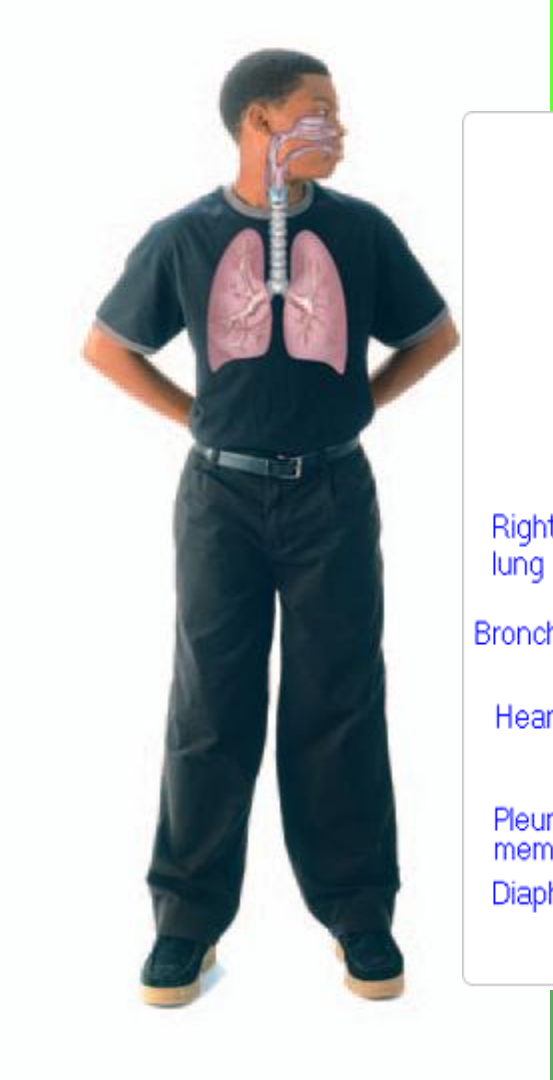
Organ Systems con't

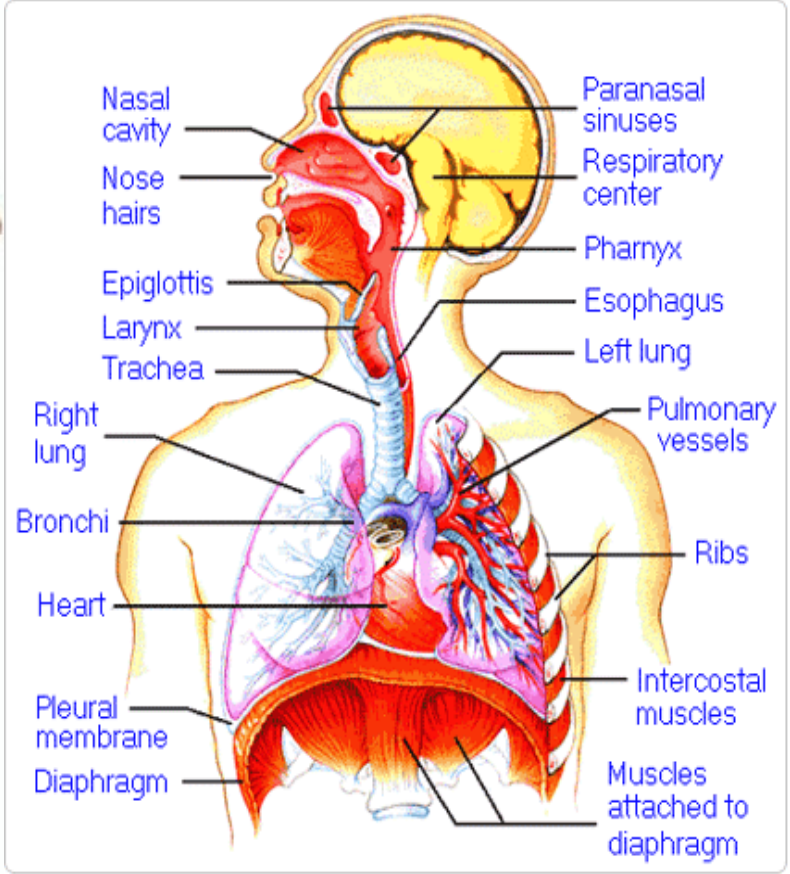
- **Nervous system –** detects information from the environment and controls body functions


Parasympathetic
Sympathetic
Dilates pupil
Stimulates flow of saliva
Ganglion
Medulla oblongata
Inhibits flow of saliva
Slows heartbeat
Accelerates heartbeat
Vagus nerve
Constricts bronchi
Dilates bronchi
Solar plexus
Stimulates peristalsis and secretion
Inhibits peristalsis and secretion
Conversion of glycogen to glucose
Stimulates release of bile
Secretion of adrenaline and noradrenaline
Contracts bladder
Chain of sympathetic ganglia
Inhibits bladder contraction

Organ Systems con't

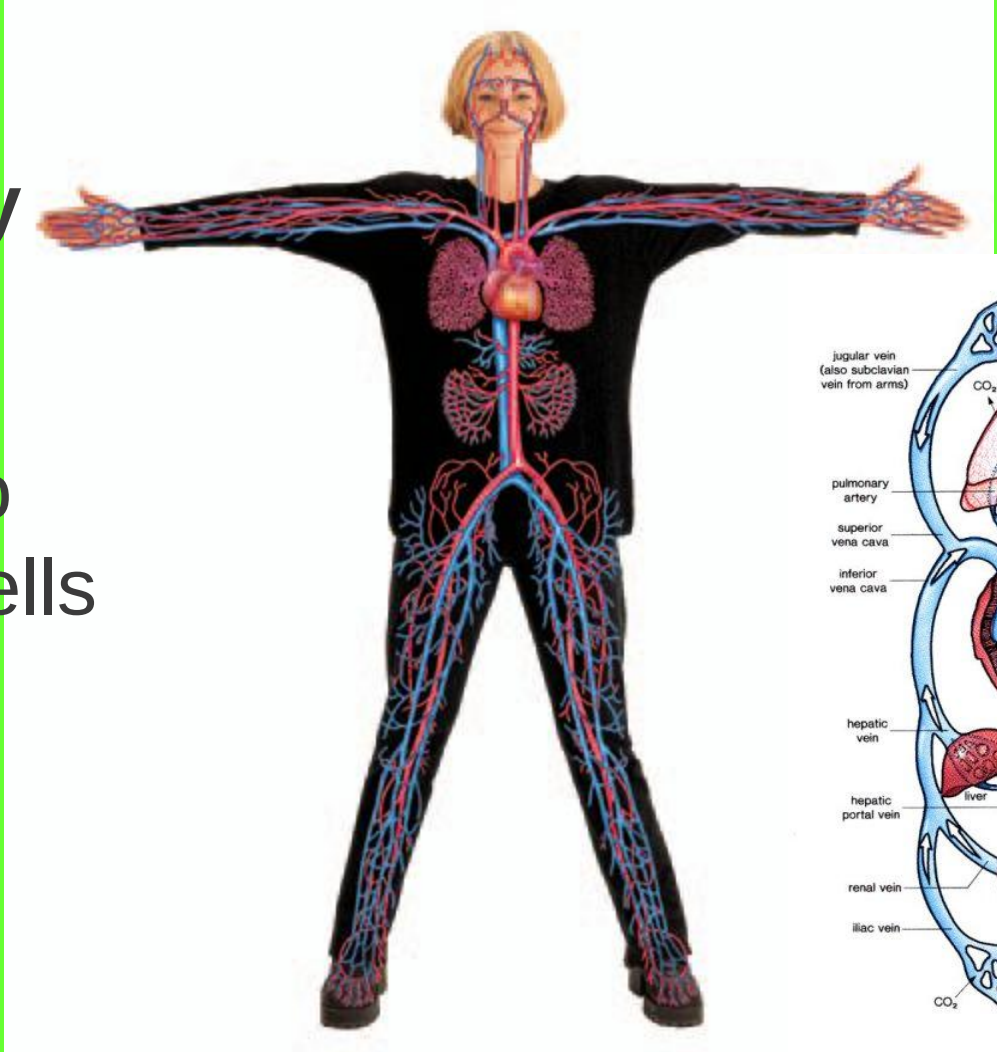
- **Respiratory System** – takes oxygen and eliminates carbon dioxide

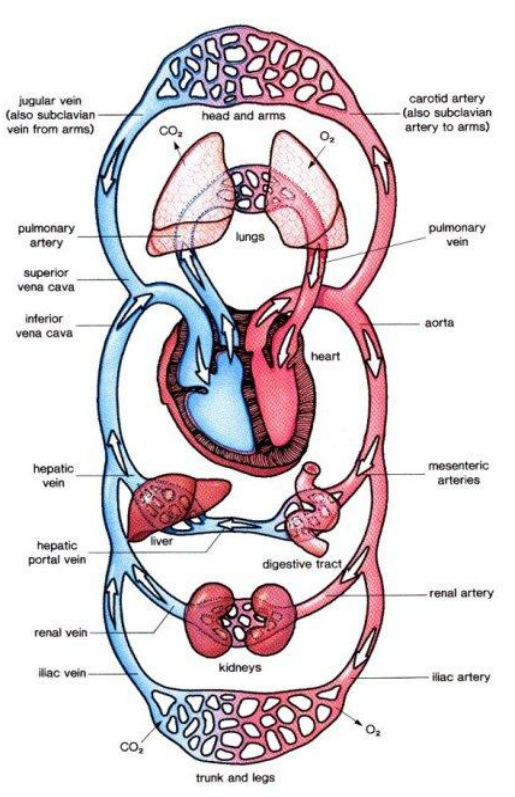




Organ Systems con't

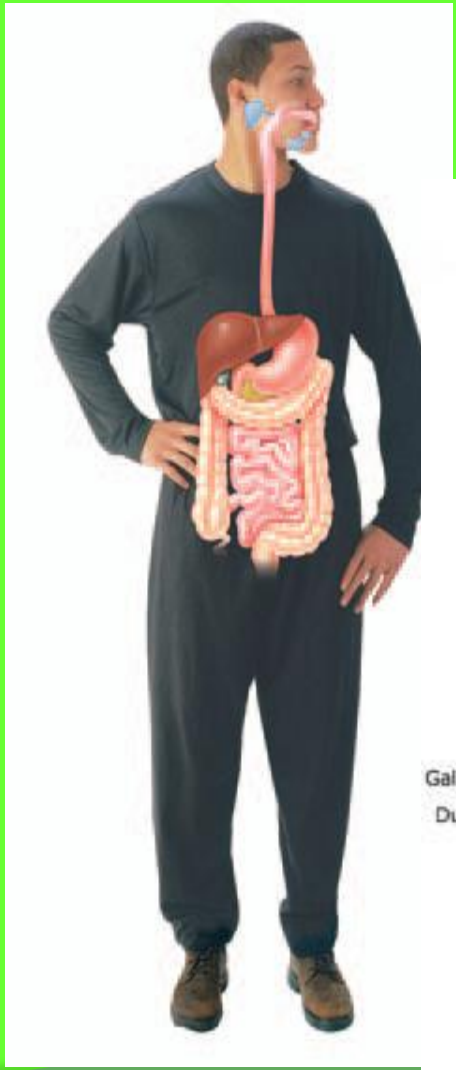
- **Circulatory system** – transports materials to and from cells

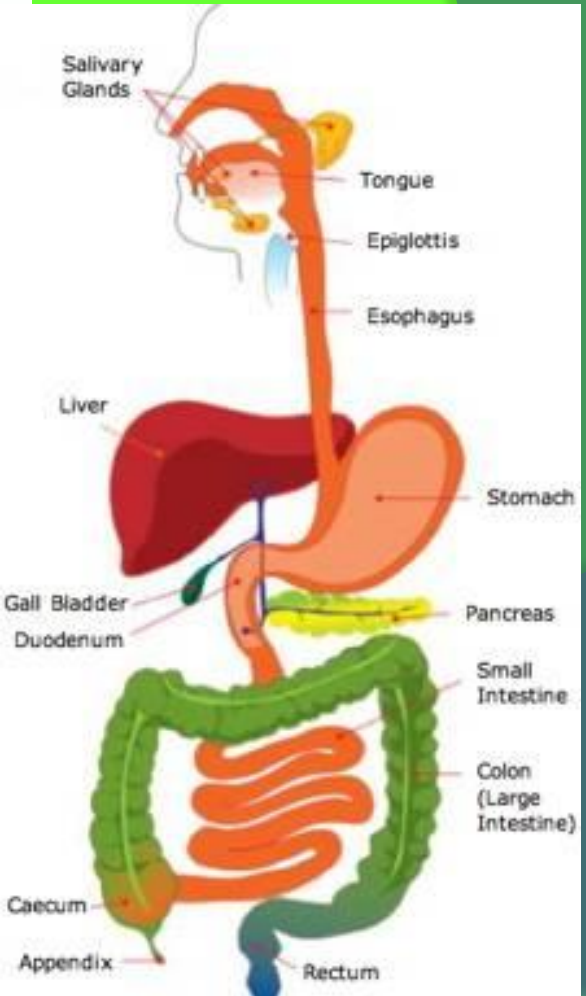




Organ Systems con't

- **Digestive system** – breaks down food and absorbs nutrients





Organ Systems con't

- **Endocrine system** – controls many body processes by means of chemicals

Organ Systems con't

- **Excretory system** – removes waste

V. Whole Body

- This organizational concept (I-IV) is the way all living things are organized as well as humans.
- The hierarchy of structures starts with the smallest part (a cell) and works up to the largest structure which is the whole body of a living thing.
- This includes plants, animals, and other microscopic organisms that are **MULTICELLULAR.** Unicellular organisms such as protists and bacteria only have one cell, so they do not have any further levels. However, they do have organelles inside their single cell!

Homeostasis:

- the process by which an organism' s internal environment is kept stable in spite of changes in the external environment.
- The body's tendency to keep internal balance.

Maintaining Homeostasis

- **Sweat** – cools organism when to warm
- **Shiver** – produces heat by rapidly contracting and relaxing muscles
- Both are ways to regulate body temperature.

What is one way to disrupt homeostasis?

- **Stress**
  - Increased heat rate
  - Increased breathing
- **What is happening in the body?**
  - Endocrine system releases adrenaline and gives energy
  - Muscles require more oxygen carried by circulatory system
  - Heart beasts faster to move blood carrying oxygen to muscles
  - Breath faster and faster so more oxygen can enter the system