

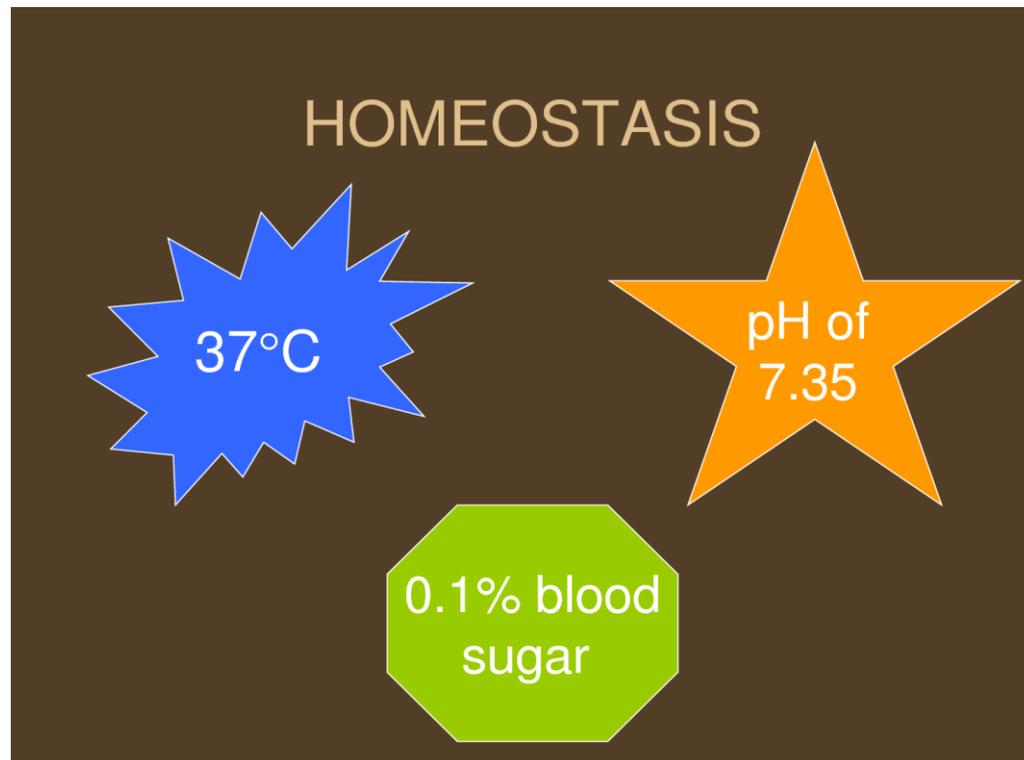
# Body Systems

## Objectives:

- Define homeostasis
- List the levels of organization
- Describe which systems interact to perform bodily functions such as nutrient absorption, reproduction and defense from illness.
- <https://www.youtube.com/watch?v=9RLnIXNlfdk>

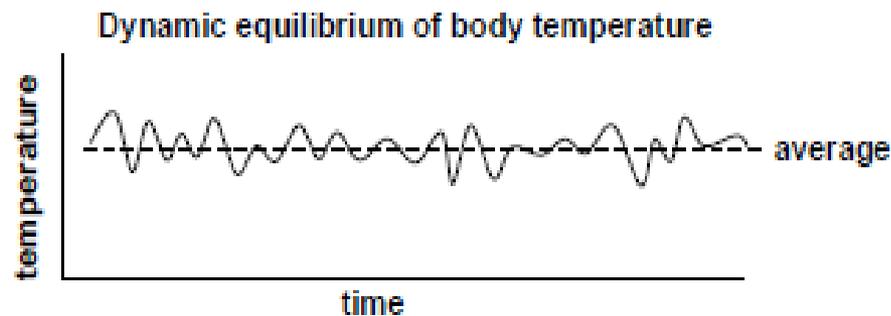
# Homeostasis:

- The ability of an organism to maintain a stable, internal environment. Body systems work together to maintain homeostasis through feedback systems.
- Homeostasis is NOT equilibrium



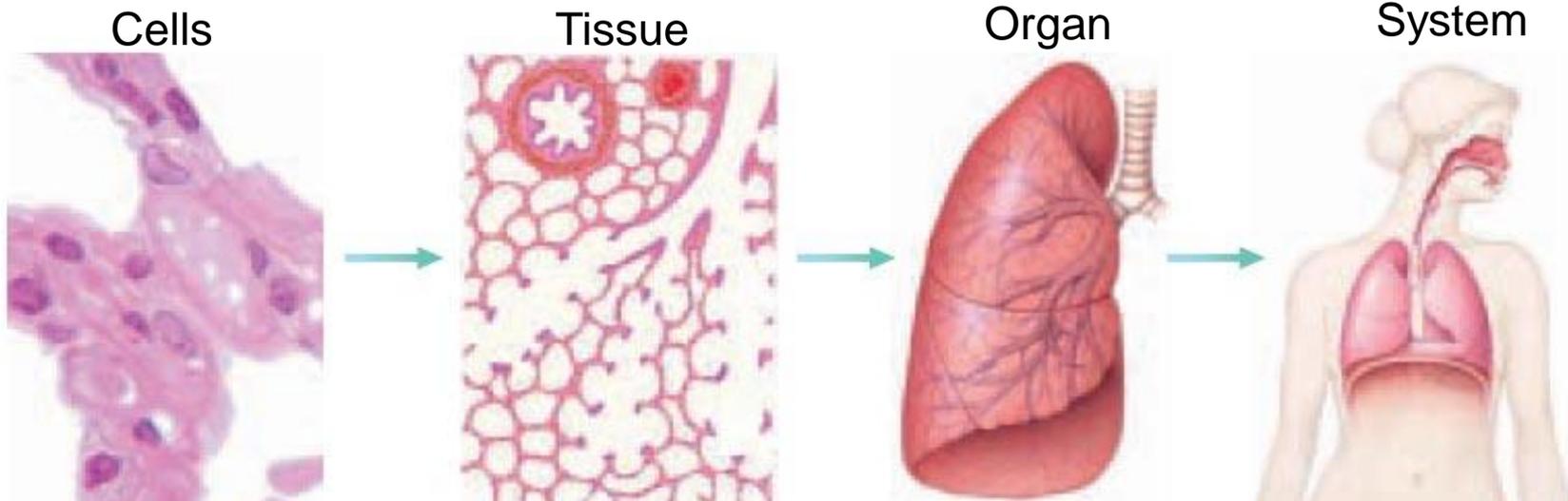
# Maintaining Homeostasis (Dynamic Equilibrium)

- Organisms are actually making changes all the time to maintain homeostasis. The term used to describe **this balanced state is dynamic equilibrium.**
- Failure of an organism to maintain homeostasis will result in disease or death for the organism.



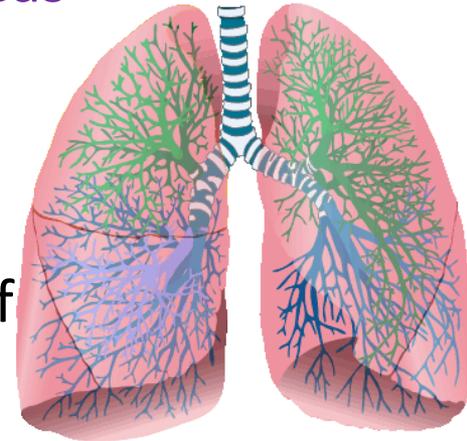
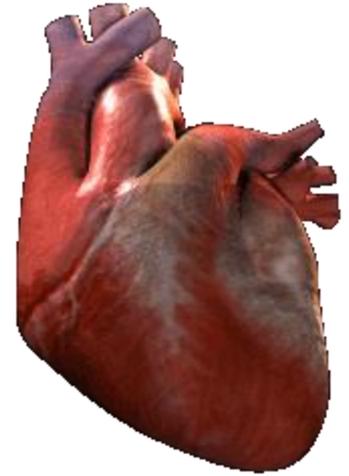
List the levels of organization starting with the basic unit of life.

- Cells
- Tissues
- Organs
- Organ Systems
- Organisms

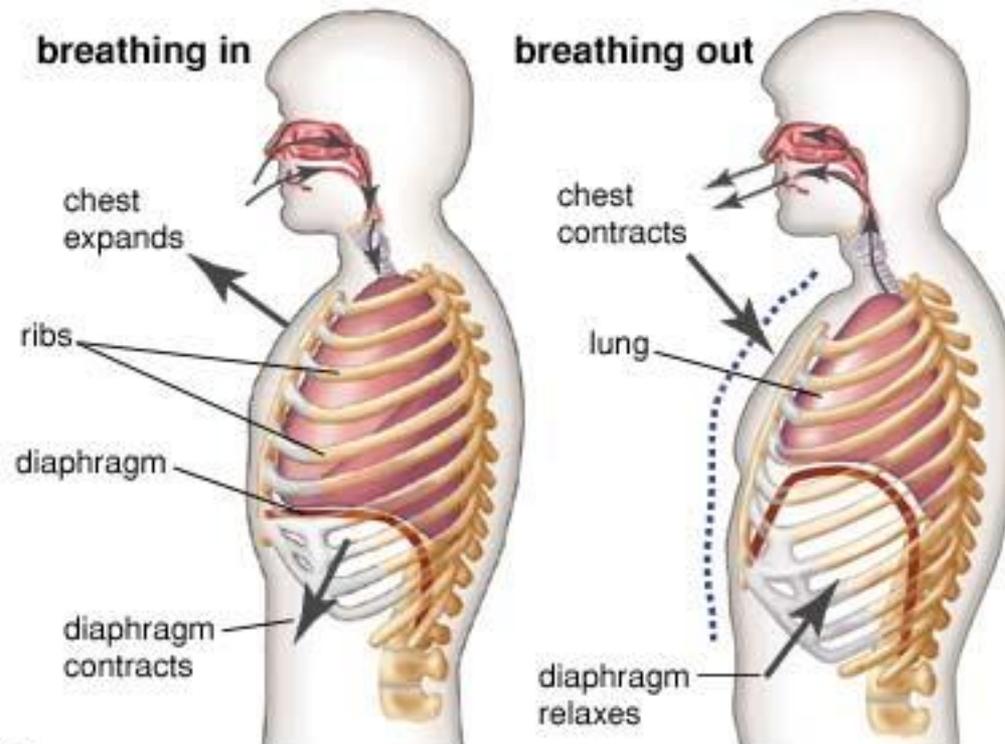


## Body Systems:

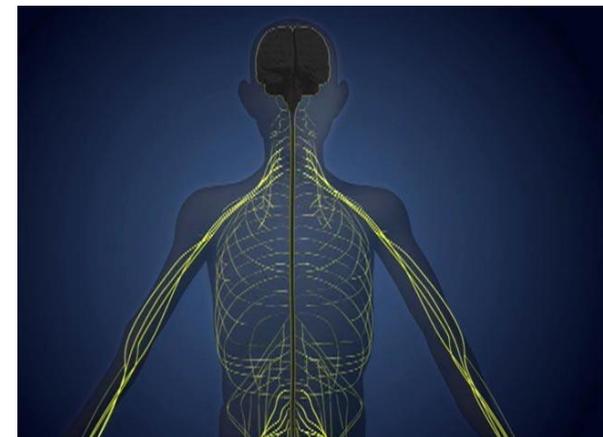
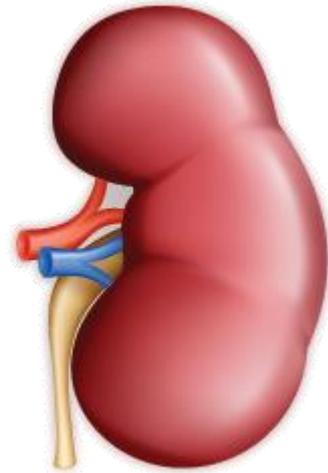
- **Circulatory** – responsible for **transporting** materials throughout the entire body. It transports **nutrients**, **water**, and **oxygen** to your billions of body cells. Works with **digestive**, **nervous**, **endocrine** and **respiratory**.
- **Digestive** – consists of organs that **break down food** into components that your body uses **for energy** and for building and repairing cells and tissues. **Pancreas** secretes enzyme into intestine to aid in digestion. Works with **circulatory** and **muscular**.
- **Respiratory** - to **supply** the blood with **oxygen** in order for the blood to deliver oxygen to all parts of the body. Works with **circulatory**, **immune** and **nervous**.



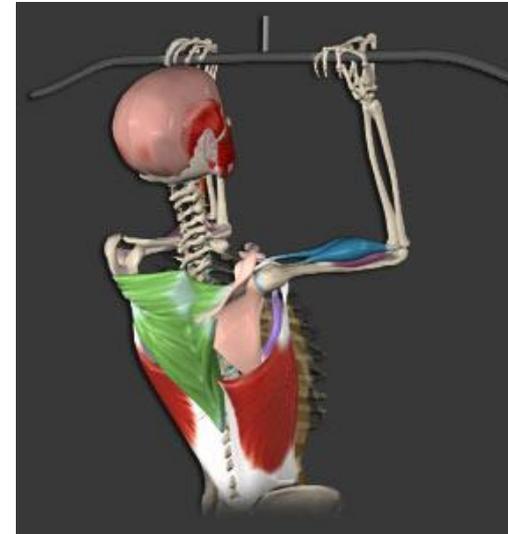
- **Respiration** – when you **inhale**, the diaphragm contracts and air is forced into your lungs. **Oxygen** then diffuses into the blood stream while  $\text{CO}_2$  diffuses back into the lungs. When the diaphragm relaxes, you exhale  $\text{CO}_2$  out. Works with **circulatory**, **nervous** and **immune**.



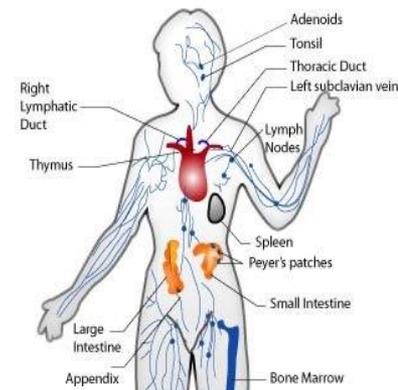
- **Endocrine** – the system of **glands**, each of which secretes a type of **hormone** directly into the bloodstream to **regulate** the **body**. The **pancreas** makes insulin to control blood sugar, the **thyroid** hormones control metabolism. Works with **reproductive, circulatory, skeletal** and **nervous**.
- **Excretory/Urinary** – The process of excretion involves finding and **removing waste** materials produced by the body. The **kidney** filters blood. Works with **digestive, muscular** and **circulatory**.
- **Nervous** - contains a network of specialized cells called **neurons** that **coordinate** the **actions** of an animal and **transmit signals** between different parts of its body. Works with **all systems**.



- **Muscular** – made up of [skeletal](#), [smooth](#) and [cardiac muscles](#). It permits **movement** of the body, maintains posture, moves food down esophagus and intestine and circulates blood throughout the body. Works with [skeletal](#), [digestive](#) and [nervous](#).
- **Skeletal** – all of the [bones](#) in the body and the tissues such as [tendons](#), [ligaments](#) and [cartilage](#) that connect them. The main job of the skeleton is to provide **support** for our body. Blood is made inside the bone Red and white blood cells. Works with [muscular](#) and [circulatory](#).
- **Integumentary** - **protects** the body from damage, comprising the [skin](#) and its appendages (including [hair](#), [scales](#), [feathers](#), [hooves](#), and [nails](#)). The integumentary system has a variety of functions; **waterproofing**, **cushioning**, and **protecting** the deeper tissues, excrete wastes, and regulate [temperature](#). Works with [immune](#).

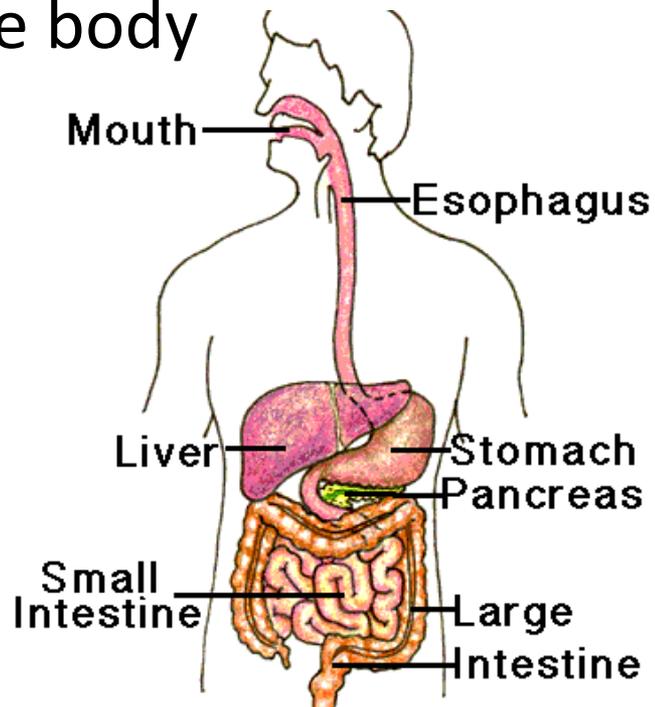


- **Immune** – It is designed to **defend** against millions of pathogens (bacteria, microbes, viruses, toxins and parasites) that would love to invade your body. The **spleen** filters the blood and stores white blood cells. Works with **integumentary, circulatory, nervous** and **respiratory**
- **Lymphatic (immune)** – composed of lymph glands, lymph nodes, and organs. The functions of this system include making white blood cells (B and T cells), the **absorption** of excess **fluid** and its return to the blood stream, **absorption** of **fat** and assisting the immune system. Works with **endocrine, circulatory** and **immune**.
- **Reproductive** – **new individuals** are produced by the fusion of haploid gametes to form a diploid zygote. Sperm are male gametes, ova/egg are female gametes. Works with **endocrine**.

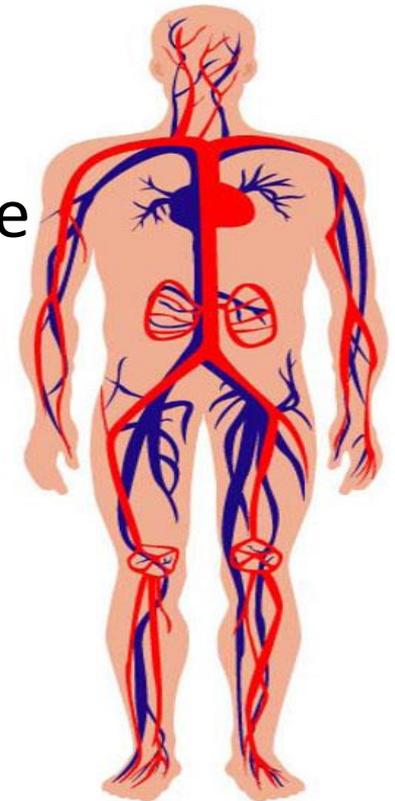


3. What two systems work in getting the necessary nutrients to the cells around your body?

- **Digestion** – breaking down food into its simplest form so that it can be absorbed into the body

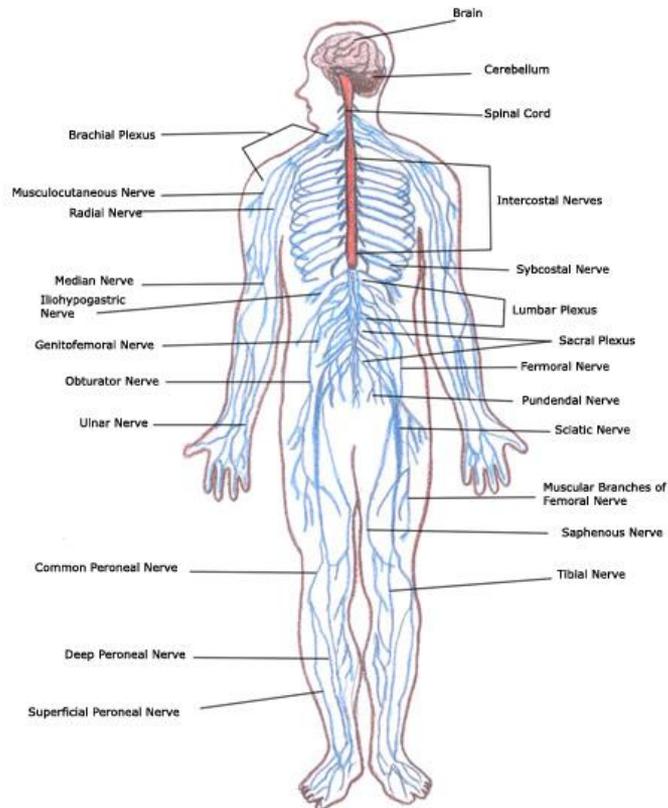


- **Circulatory** – transporting nutrients from digestion and oxygen throughout the body to maintain homeostasis.



4 Maintaining homeostasis in your body is made possible through coordination of all your body systems. What two body systems are mainly responsible for this coordination?

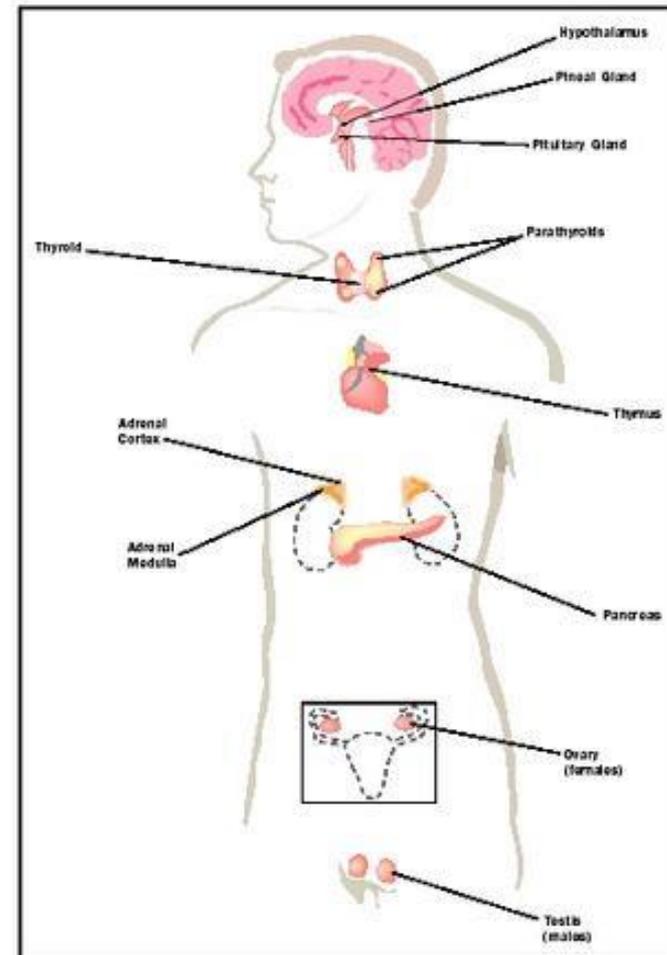
## Nervous System



Sketch by Abhishake Sharma

**Nervous System Diagram**

## Endocrine System



5. There are differences between the nervous and the endocrine system. They communicate to the body in different ways.

### **Nervous System**

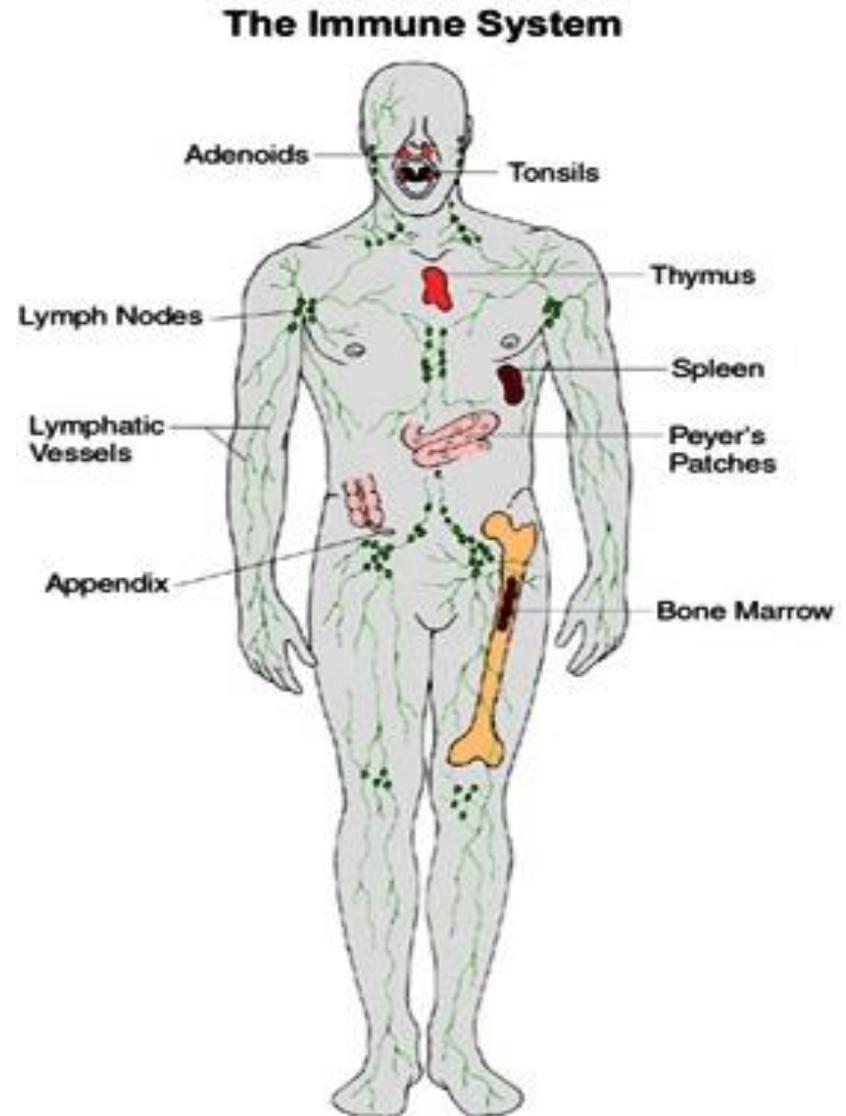
- Wired system, specific structural arrangement between Neurons & Target cells
- Neurotransmitter released & diffuse through short distance
- Anatomic relationship between Nerve cell & Target cells.
- Response is rapid & brief (m Sec)
- Coordinates rapid & precise responses

### **Endocrine system**

- Wireless system, No structural connection with one another/target cells
- Hormones released, carried in blood to long distance.
- Specificity of target cell binding
- Slow & long lasting response
- Control activities of long duration e.g. Growth, Reproduction, Metabolism, Water & Electrolyte regulation

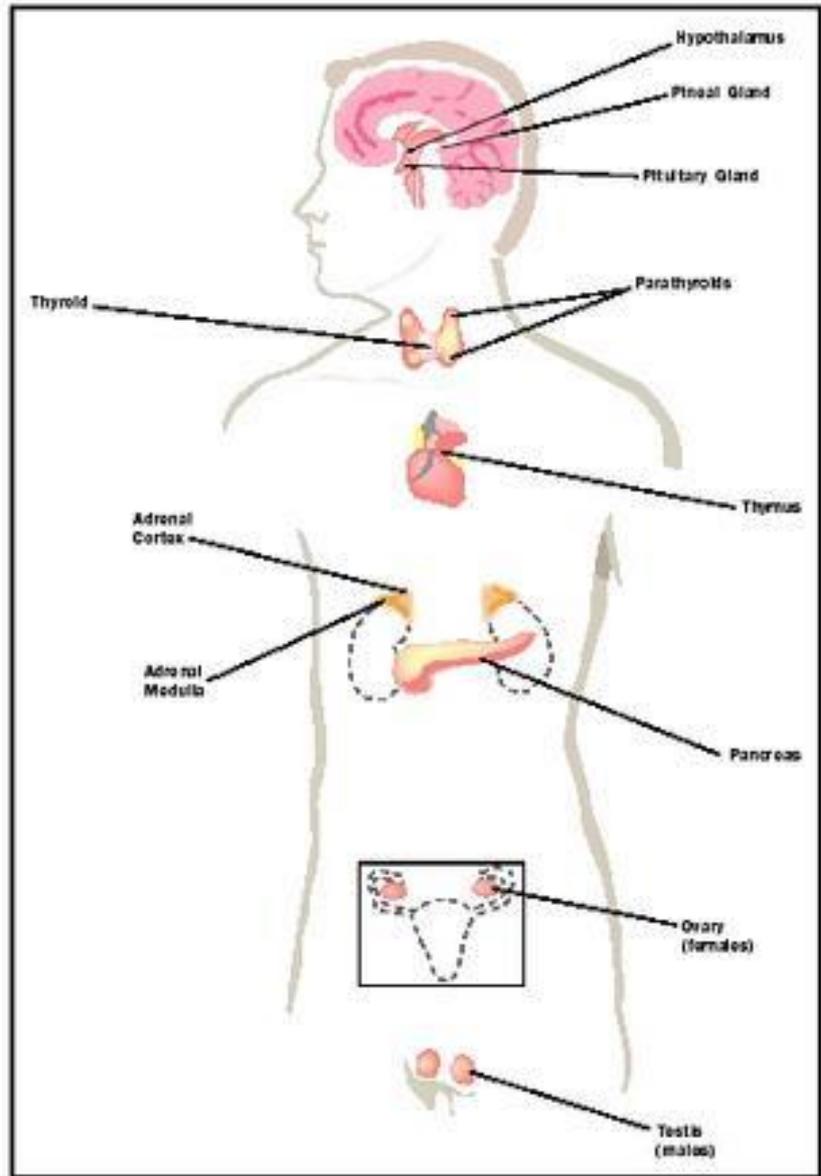
6. What two systems are impacted when you are given a vaccination?

- **Circulatory** – transports the vaccine
- **Immune** – builds antibodies to fight off infections.



## 7. What two systems interact during sperm/egg production?

- **Endocrine** – the hypothalamus sends messages to the pituitary to make hormones.
- **Reproductive** – receives the hormones and produces sperm and eggs.



8. Give two examples of body responses that are a result of direct interactions between the skeletal, muscular, and nervous systems.

**Running Away from Danger!**



**Eating a Cheeseburger**



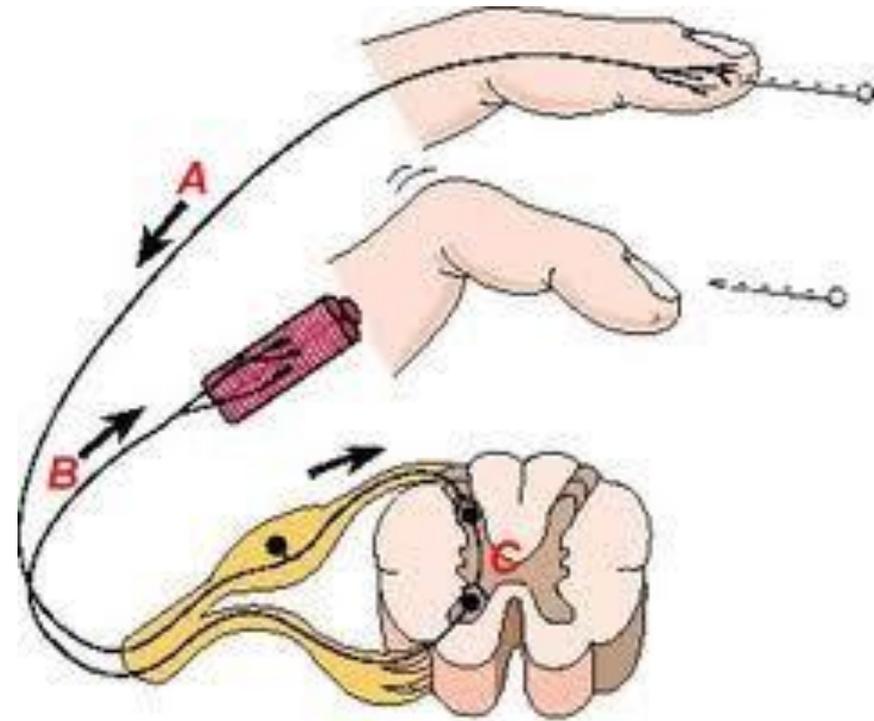
9. Which body systems work together to remove excess water from the body?

- Endocrine
  - Circulatory
  - Excretory/Urinary
- 
- When you are dehydrated, the pituitary releases a hormone into your bloodstream to tell you kidneys to hold onto water.
  - When you have too much water, the pituitary stops releasing the hormone, so that you can excrete the excess water (pee...)



10. What three systems work together to respond when you touch something that causes you pain, such as a hot stove?

- Nervous, Muscular and Skeletal
- The signal goes from the touch receptors (nerves) to the spinal cord and then to your muscles to get you away from the danger quick!



**Try the next questions on your own. Have your teacher check them when you are done.**

- **When your body is regulating how much calcium to release from your bones, what happens?**
  - The \_\_\_\_\_ system makes certain hormones.
  - Blood in the \_\_\_\_\_ system carries the hormones to the \_\_\_\_\_ system where the bones are found.
  - The **ENDOCRINE** system makes certain hormones.
  - Blood in the **CIRCULATORY** system carries the hormones to the **SKELETAL** system where the bones are found.

- **When your body is absorbing nutrients, what's happening?**
  - Food is broken down in the stomach mechanically by the **MUSCULAR system (churns food)** and chemically by water, acid, and enzymes in the **DIGESTIVE system**.
  - Nutrients are then absorbed by blood in the **CIRCULATORY system**.

- **What triggers ovulation (the release of an egg) in a female?**

- Certain hormones produced in the ENDOCRINE system control ovulation in a female's REPRODUCTIVE system.

- **What is going on in your body when a pathogen enters?**
  - Mucus in the lungs traps a virus in the RESPIRATORY system.
  - T-cells in the IMMUNE system destroy virus infected cells.
  - Nerves in the NERVOUS system sense the need to cough.