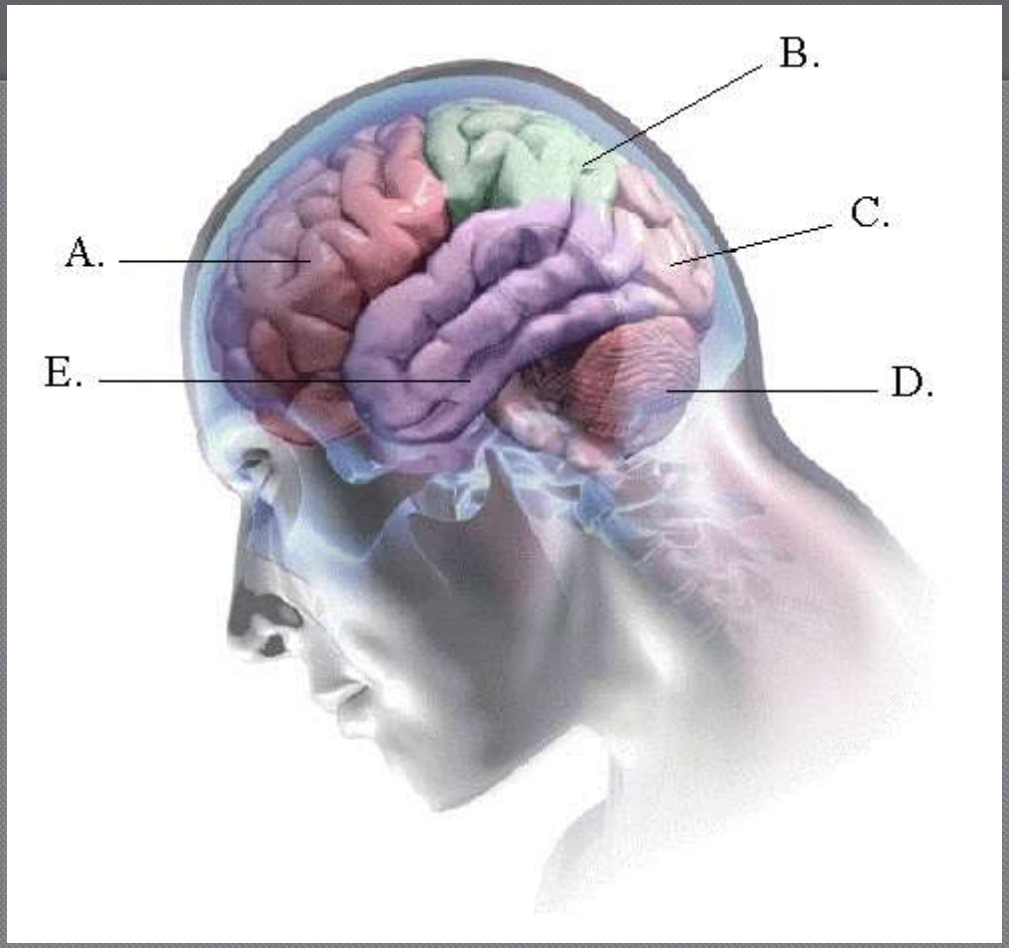
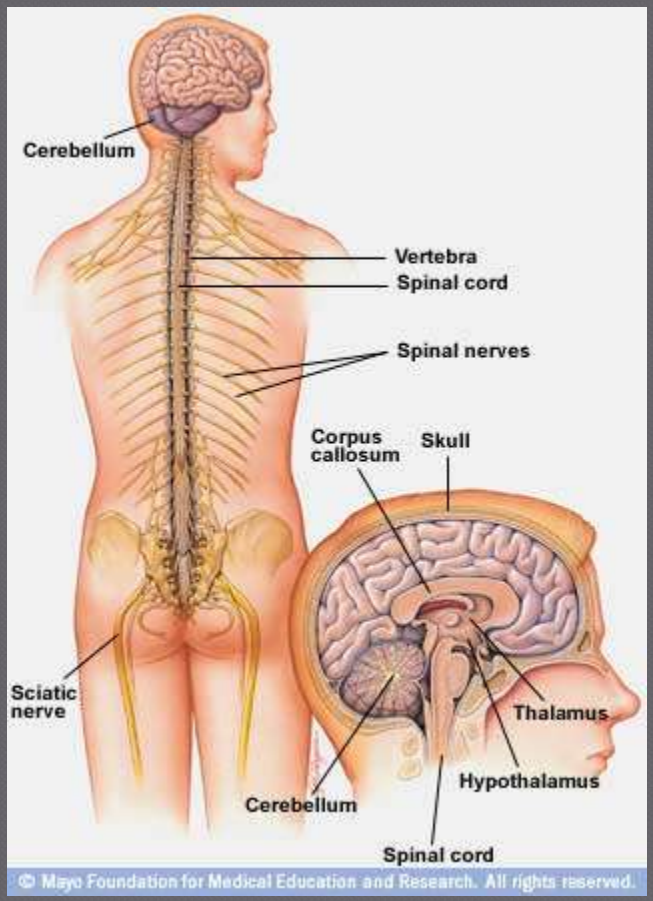
Biology and Behavior



Chapter 3

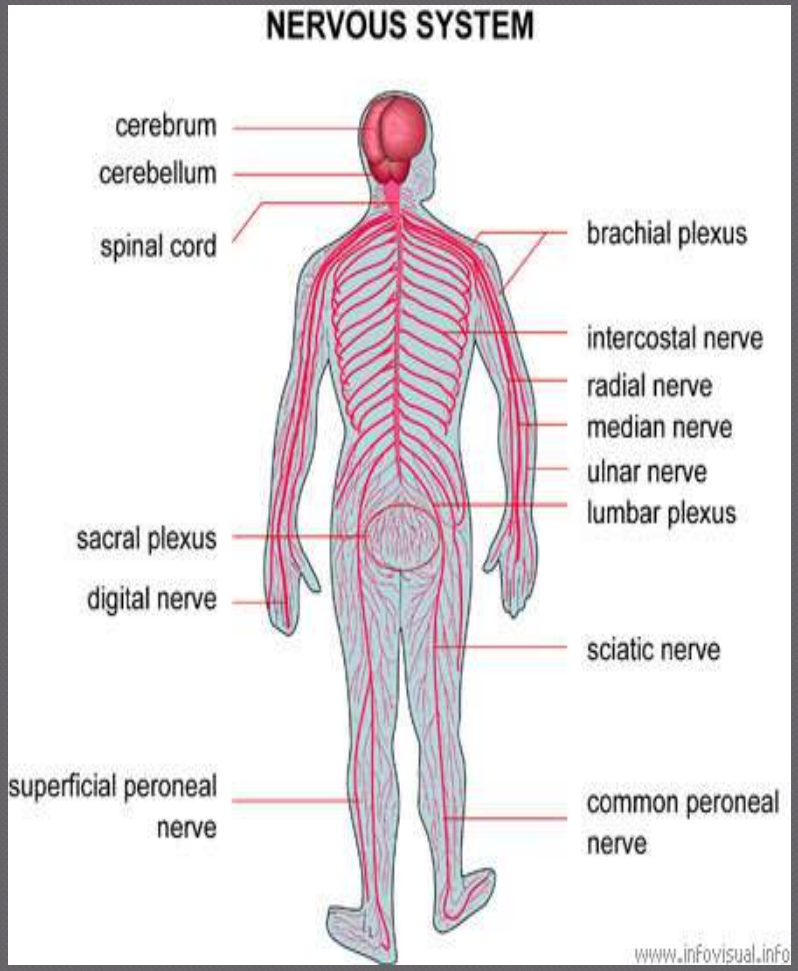
Brain and Nervous System



- Your brain contains billions of nerve that coordinate thought, emotion, behavior, movement and sensation
- A system of nerves connects your brain to the rest of your body
  - communication can occur in split seconds
  - Think about how fast you pull your hand back from a hot stove.
- While all the parts of your brain work together, each part is responsible for a specific function — controlling everything from your heart rate to your mood.

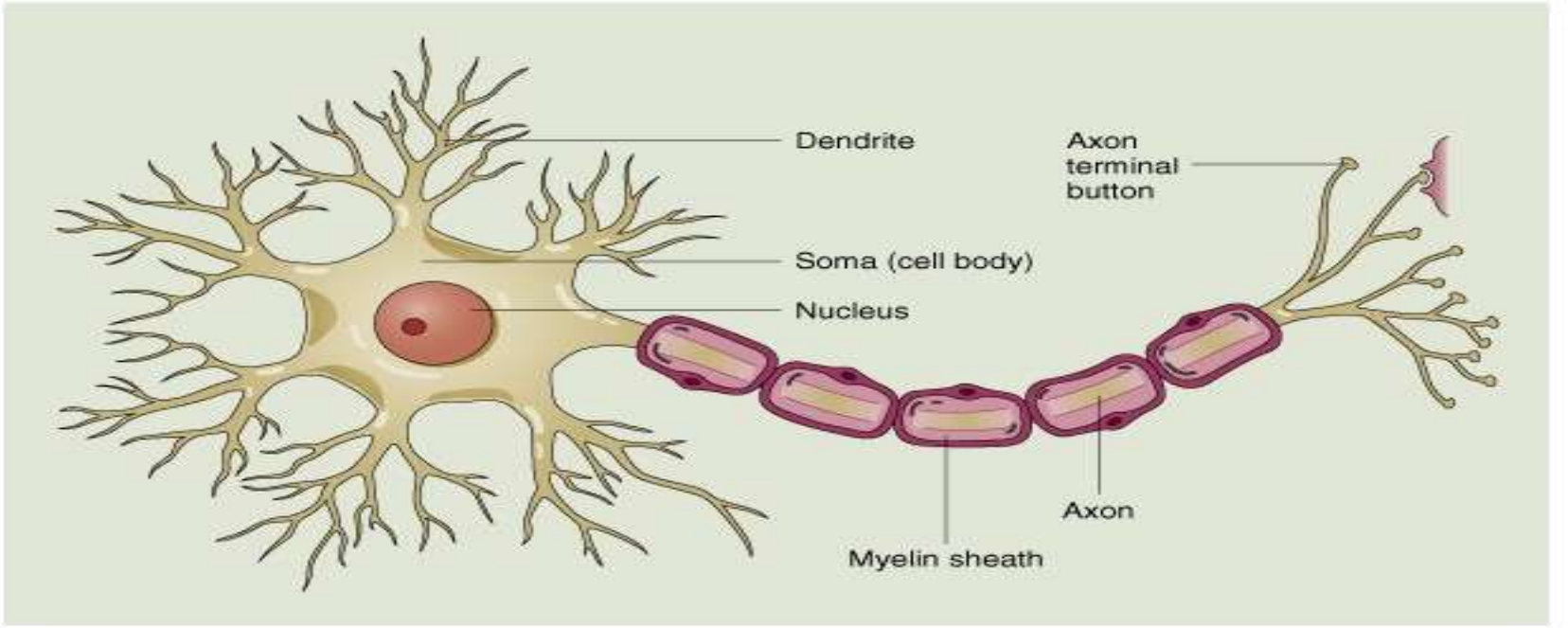
Nervous system

- Involve thinking, feeling, and reactions to the external world
- Central Nervous system- consists of the brain and the spinal cord, transmits messages from the brain to the muscles and back to the brain
- Peripheral nervous system- nerve cells that sends messages through out the body



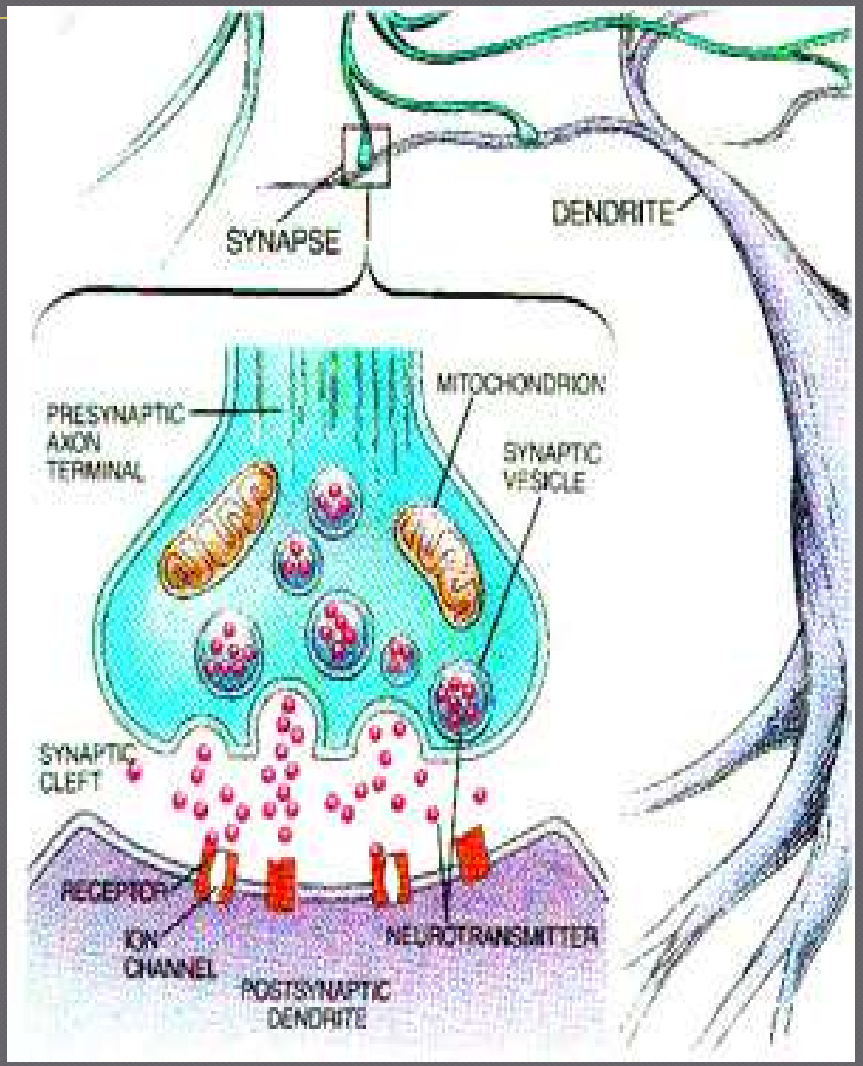
Parts of a Neuron

- Neurons- send and receive messages
- Dendrites- receive information from other neurons
- Axon- carries messages away
- Axon Terminals- branches at the end of the axon

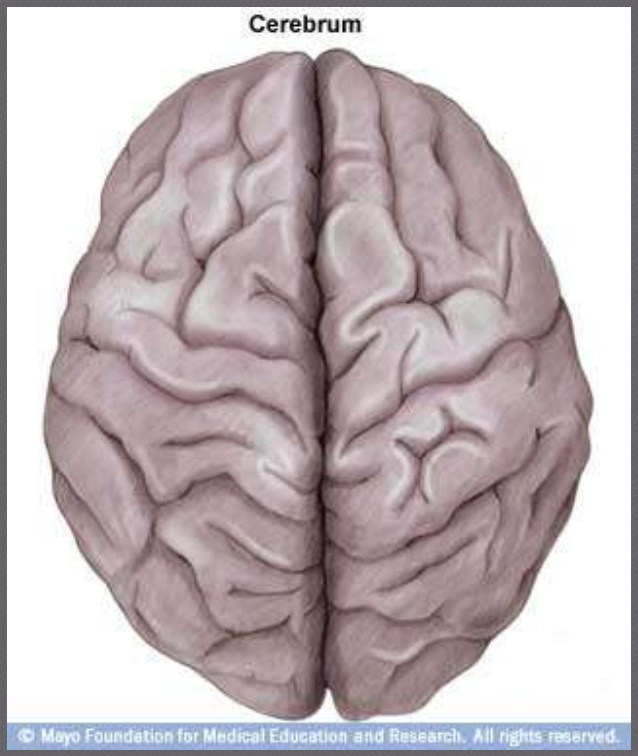


Sending Messages

- Messages are sent between two neuron and must cross the synapse
  - The synapse is the space between one neuron and the dendrites of another
- Neurotransmitters are chemical stored in the axon terminals this message is transferred into electrical impulses

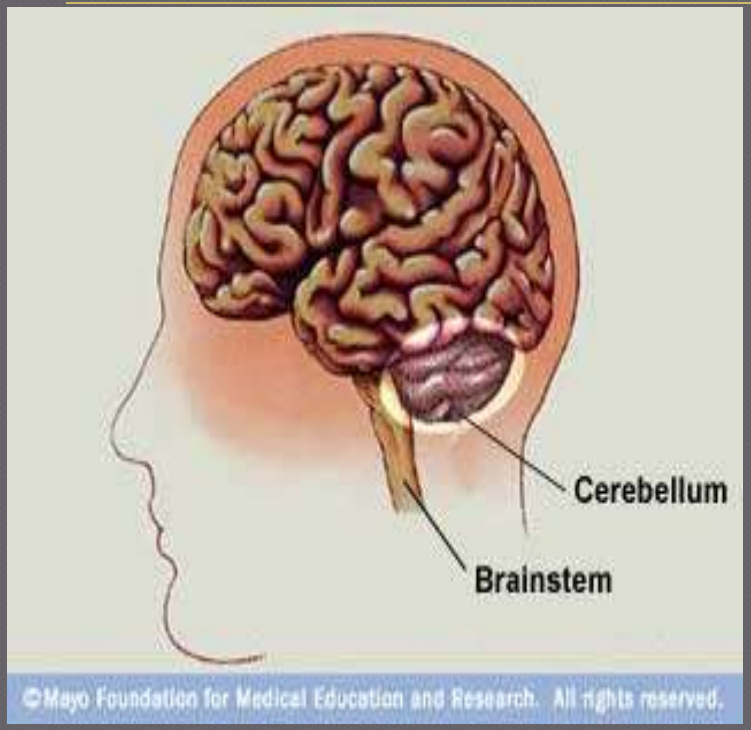


The Brain



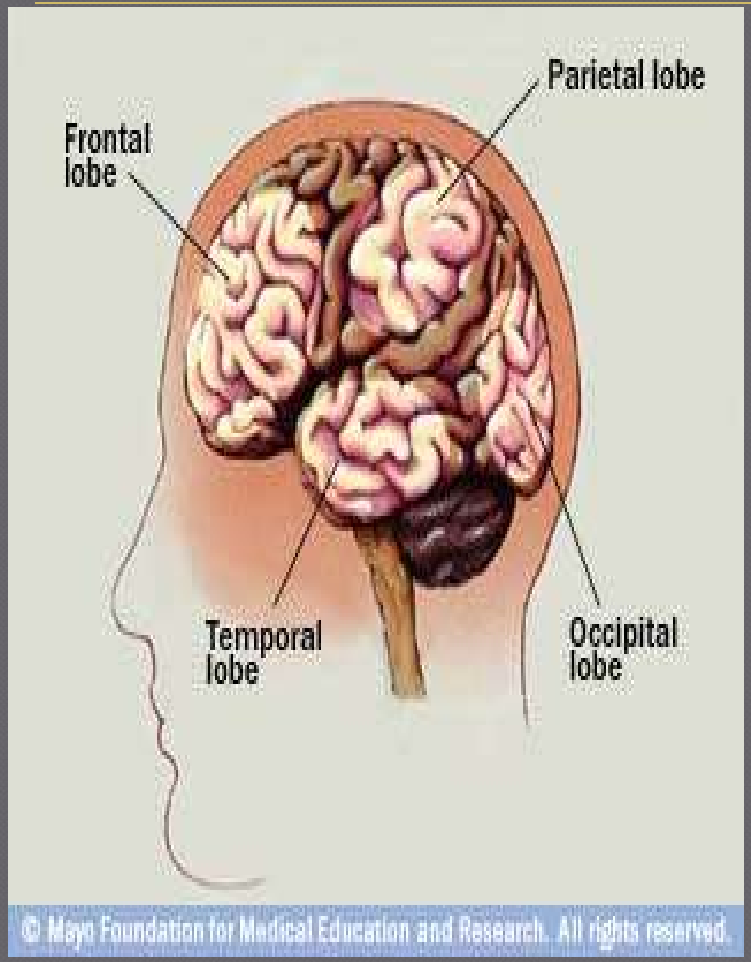
- Cerebrum is the largest part of your brain
- Cerebral cortex -The outermost layer of the cerebrum
  - Deep folds and wrinkles in the brain increase the surface area of the gray matter, so more information can be processed.
- The cerebrum is divided into two halves (hemi-spheres).
- Corpus Callosum- Connects the hemispheres to communicate with each other through a thick tract of nerves

Cerebellum and brainstem



- Cerebellum -combines sensory information from the eyes, ears and muscles to help coordinate movement
- Brainstem links the brain to the spinal cord. It controls many functions vital to life, such as
  - heart rate
  - blood pressure and breathing
  - also important for sleep.

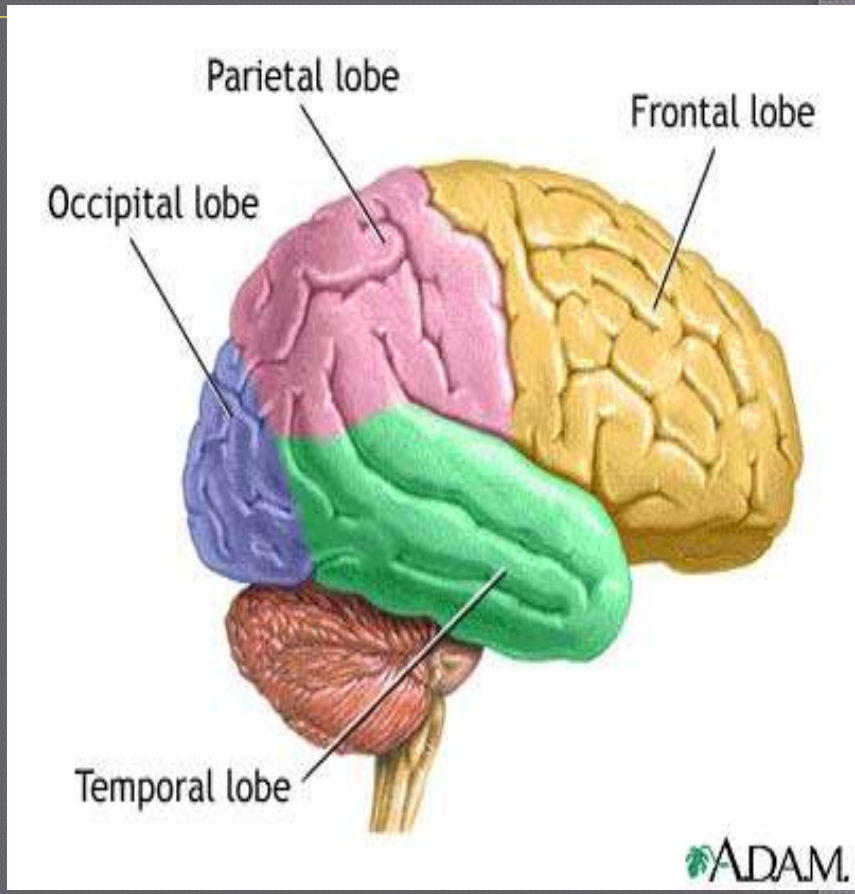
Lobes of the Brain



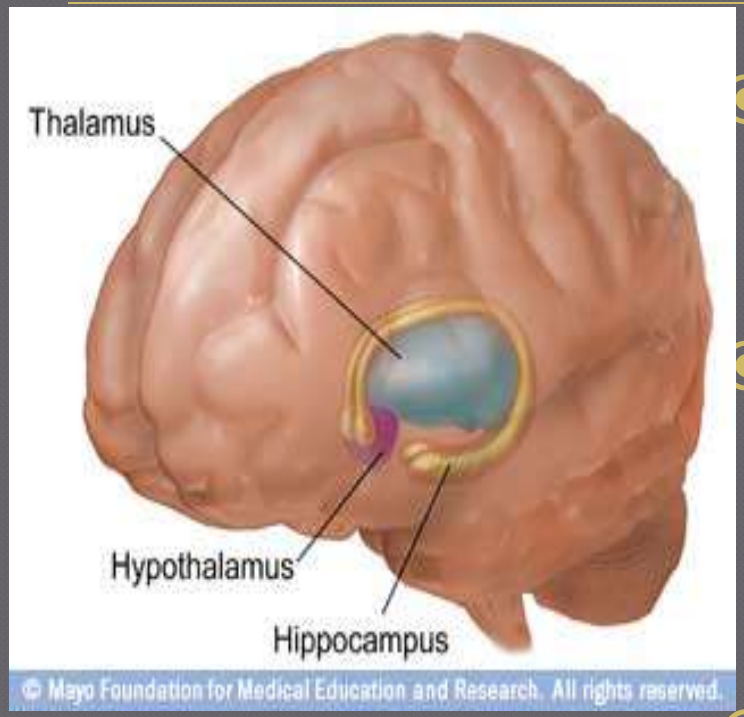
- Each of your brain's hemispheres is divided into four lobes.
- Frontal lobe is responsible for
  - judgment, creativity, problem solving and planning also short term memory
  - helps control voluntary movement, while a place in the left frontal lobe allows thoughts to be transformed into words.
  - Last to develop- ages 18-25
- Parietal lobe locate in top back, is responsible for
  - higher sensory and language functions such as taste, temperature and touch it also helps with reading and math

Lobes of the Brain

- **Occipital lobe** is responsible for
  - vision, process images from the eyes and link that information with images stored in memory
- **Temporal lobes** located around the ears are responsible for
  - hearing, memory and language,
  - translate information from the ears, including music.
  - The underside of the temporal lobe plays a crucial role in memory.



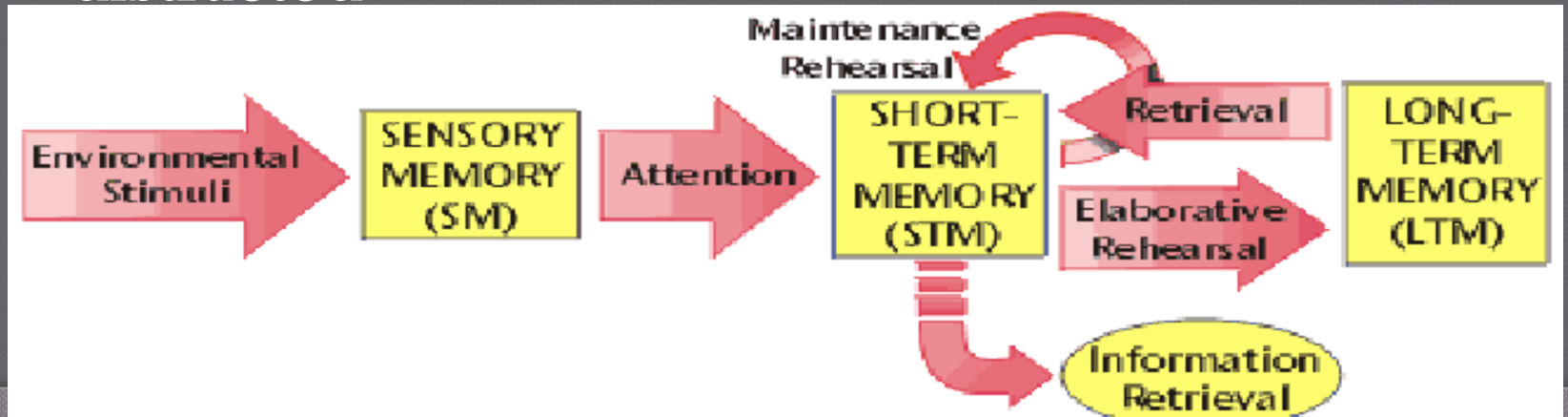
The Inner Brain



- Structures deep within the brain control your emotions and memories.
- Thalamus acts as a gatekeeper for messages passed between the spinal cord and the cerebral hemispheres.
- Hypothalamus controls emotions such as exhilaration and anger.
  - It also regulates your body's temperature and is responsible for crucial urges such as eating, sleeping and sexual behavior.
- Hippocampus is a memory indexer, sending memories to be stored in appropriate sections of the cerebrum and then recalling them when necessary.

How the Brain Learns

- New information is received by the senses, and it is processed in the frontal lobe into short term memory for about 5-20 seconds.
- Most new information is never remembered
- If it is deemed important, it is sent to the hippocampus.
- The information is processed and place in a "file" in the cortex. Your state of mind activates these networks of connections.
- When you are in a clear thinking, comfortable and safe frame of mind, you will learn and recall more than if you're depressed, tired, hungry, angry or distracted

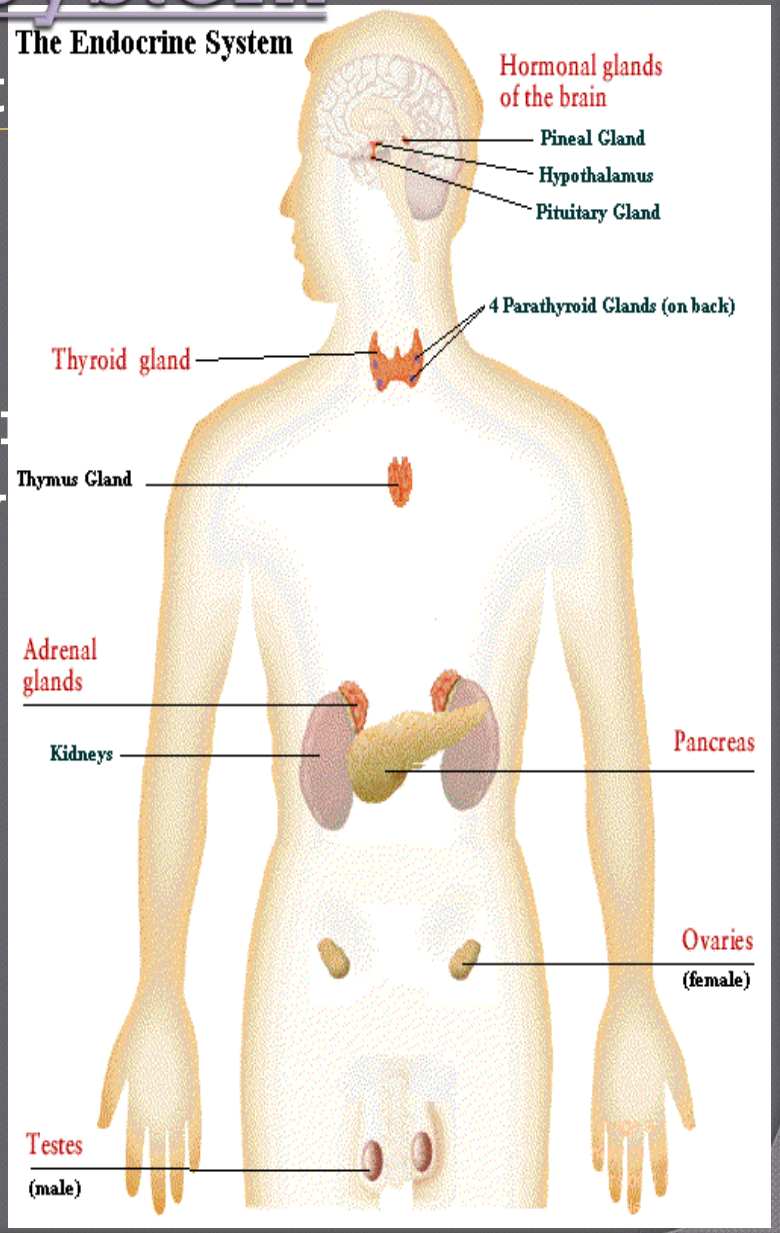


The Brain

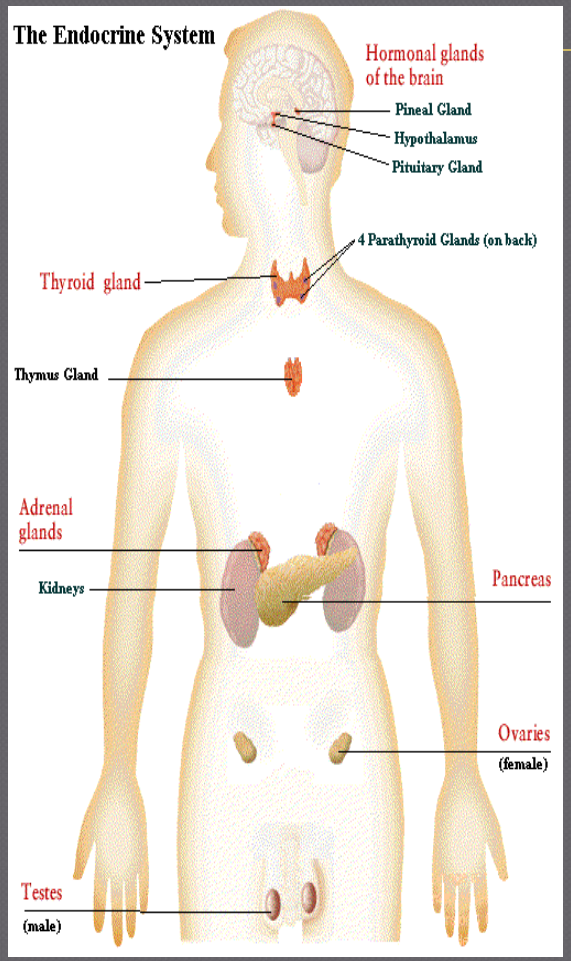
- From birth to the teen years the brain grows four times in volume.
- Infants are born with about one trillion Synapse connections in place.
  - A baby's interaction with their environment helps create many new connections.
- Pruning- eliminates many unnecessary connections but creates new connections.
- Factors such as stress can inhibit growth and exercise encourages growth.
- You lose brain cells from decay and disuse
- Use it or lose it.

Endocrine System

- Consists of glands that secret hormones into the blood stream
- Pituitary Gland- "master gland" – growth hormones for physical changes in the body
- Thyroid Gland- produces thyroxin- affects body's metabolism
  - Too little-Hypothyroidism= overweight
  - Too much- Hyperthyroidism= excitability, inability to sleep, weight loss



Endocrine System



- **Adrenal Glands-** produce cortical steroids- increase resistance to stress and muscle development
  - Causes liver to release stored sugars- energy in emergencies to arose the body to cope with stress
- **Testes and Ovaries-** produce hormones testosterone, estrogen progesterone

The Nature Vs. Nurture Debate

- Genes are passed through Chromosomes (DNA) from parents
- Nature- refers to what people inherit genetically
- Nurture- refers to environmental factors of what a person is exposed to in life
- Factors such as family, education, culture and individual experiences contribute to environment
- What perspective do you agree with?