MODULE 11 STUDYING THE BRAIN, AND OLDER BRAIN STRUCTURES

THE TOOLS OF DISCOVERY: HAVING OUR HEAD EXAMINED

- Scientists have discovered different aspects about the brain when using a technique called **LESIONS**. This is where tiny clusters of brain cells are destroyed leaving the surrounding tissue unharmed. Today, lesion is less seen as other ways, such as electrically, chemically, and magnetically stimulating different parts of the brain and note the effect.
- **ELECTROENCEPHALOGRAM** (EEG) is an amplified readout of such waves.
- **COMPUTED TOMOGROPHY SCAN** (CT) examines the brain by taking X-Ray photographs that can reveal brain damage.
- **POSITRON EMISSION TOMOGRAPHY** (PET) is a visual display of brain activity that detects where a radioactive form of glucose goes while the brain performs a given task.
- **MAGNETIC RESONANCE IMAGING** (MRI) is a technique that uses magnetic fields and radio waves to produce computer-generated images of soft tissue. MRI scans show brain activity.
- **FUNCTIONAL MAGNETIC RESONANCE IMAGING** (fMRI) is a technique for revealing blood flow and, therefore, brain activity by comparing successive MRI scans. Shows brain function as well as its structure.
- Our brain processes most information outside of our awareness (unconsciously).

THE RETICULAR FORMATION

- Inside the Brainstem, lies the **RETICULAR FORMATION** (attention and arousal) neuron network that extends from the spinal cord right up through the thalamus. Allows messages to be send to other parts of the brain.

CEREBELLUM

- The **CEREBELLUM** (balance and memory) meaning "little brain" enables nonverbal learning and memory. It also helps us judge time, modulate our emotions, and discriminate sounds and textures.

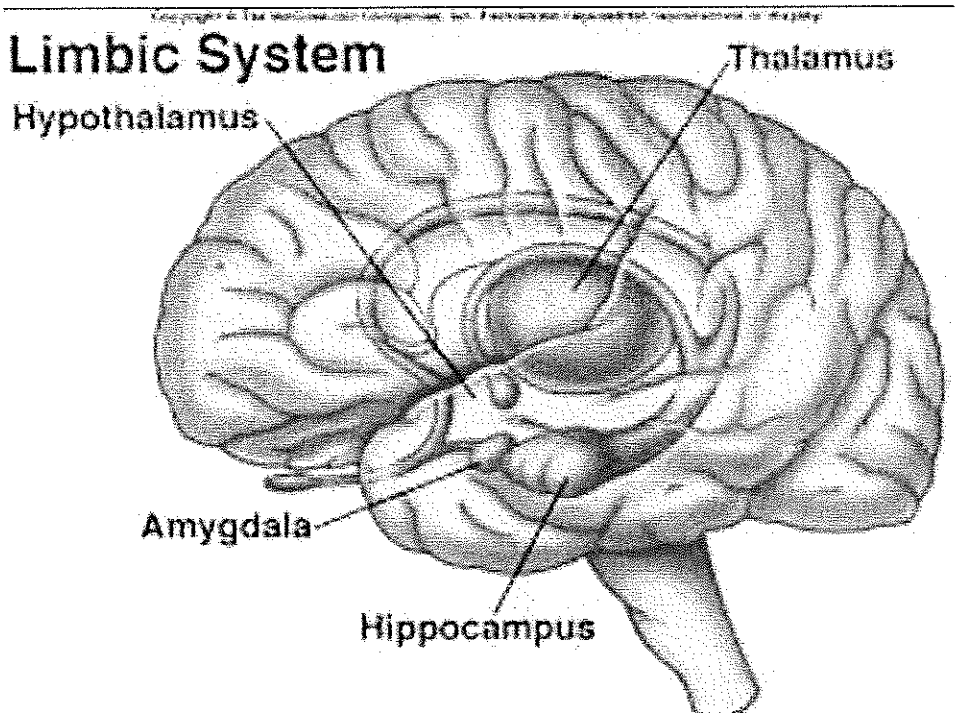
THE LIMBIC SYSTEM

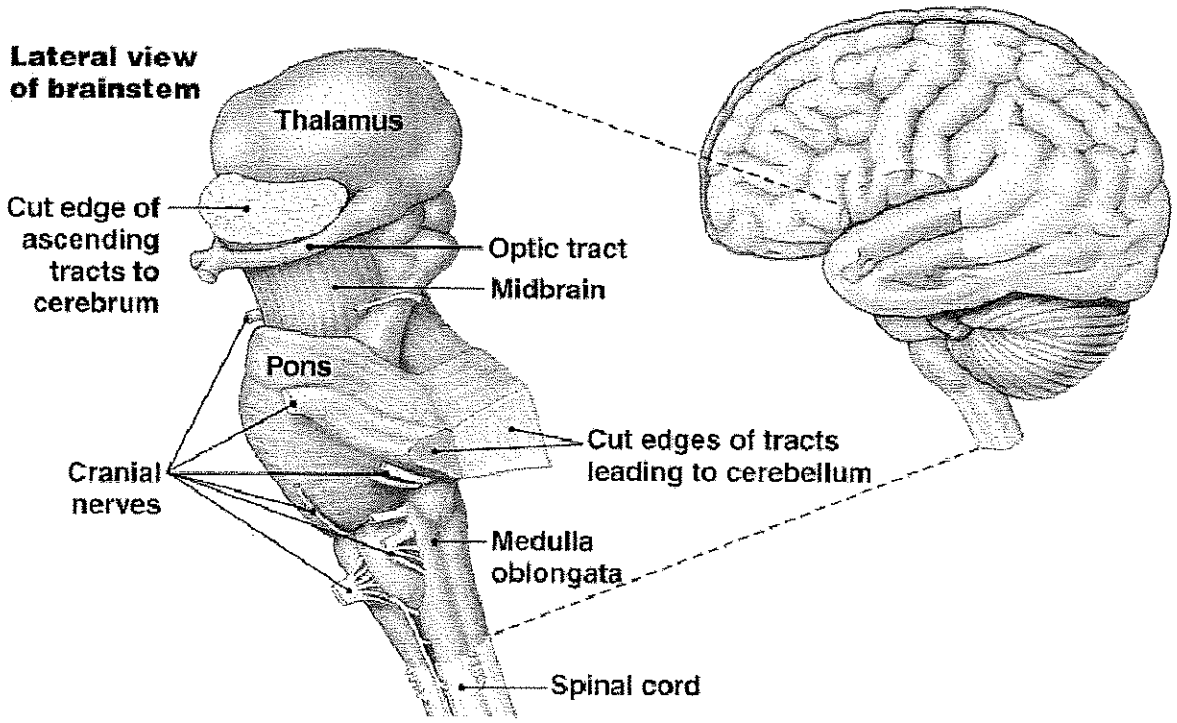
- Is a system consisting of hypothalamus, amygdala, and hippocampus. Known as the "pleasure center." Dopamine-induced pleasant feelings.
- The **AMYGDALA** (primitive emotions) controls aggressions and fears. Creates a mellow individual. The difference from feeling courageous to shivering in fright.

- The **HIPPOCAMPUS** (memory..short to long) deals with forming memories and short-term memory recollections.
- Just below the thalamus is the **HYPOTHALAMUS** (eating, drinking, and sex) stimulates a rewarding system.

OLDER BRAIN STRUCTURES

- The **BRAINSTEM** is the oldest part and central core of the brain, beginning where the spinal cord swells as it enters the skull; the brainstem is responsible for automatic survival functions.
- **MEDULLA** is the base of the brainstem; controls heartbeat and breathing.
- **PONS** is just above the medulla and helps coordinate movements. Relaxation and dreaming.
- Sitting atop the brainstem is the **THALAMUS**, a pair of egg-shaped structures that act as the brain's sensory control center.





BE ABLE TO ANSWER: Within what brain region would damage be most likely disrupt your ability to skip rope? Your ability to sense tastes or sounds? In what brain region would damage perhaps leave you in a coma? Without the very breath and heartbeat of life?

PRACTICE FRQ: Following a brain injury, Mike struggles to control his emotions and has difficulty establishing new memories. What parts of Mike's brain have most likely been affected by his injury?