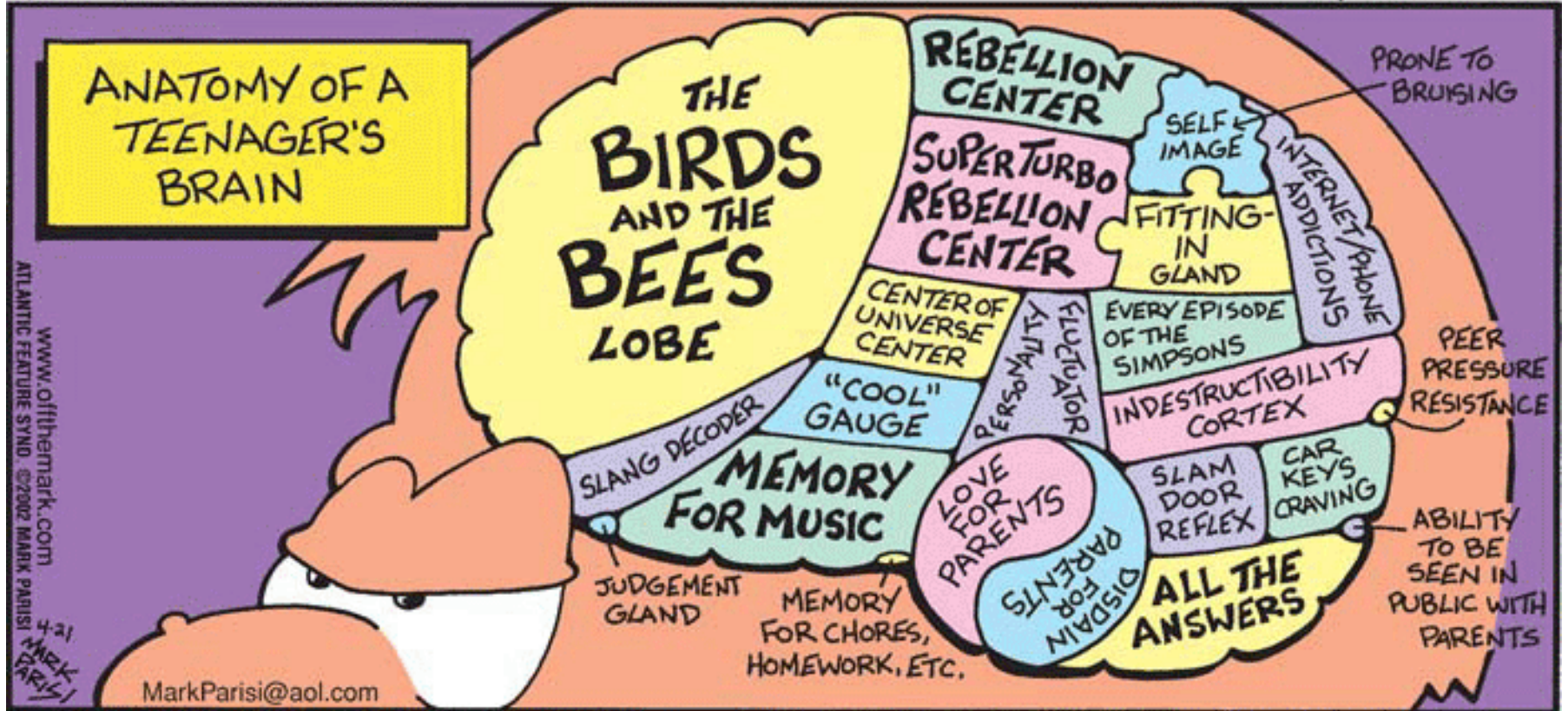
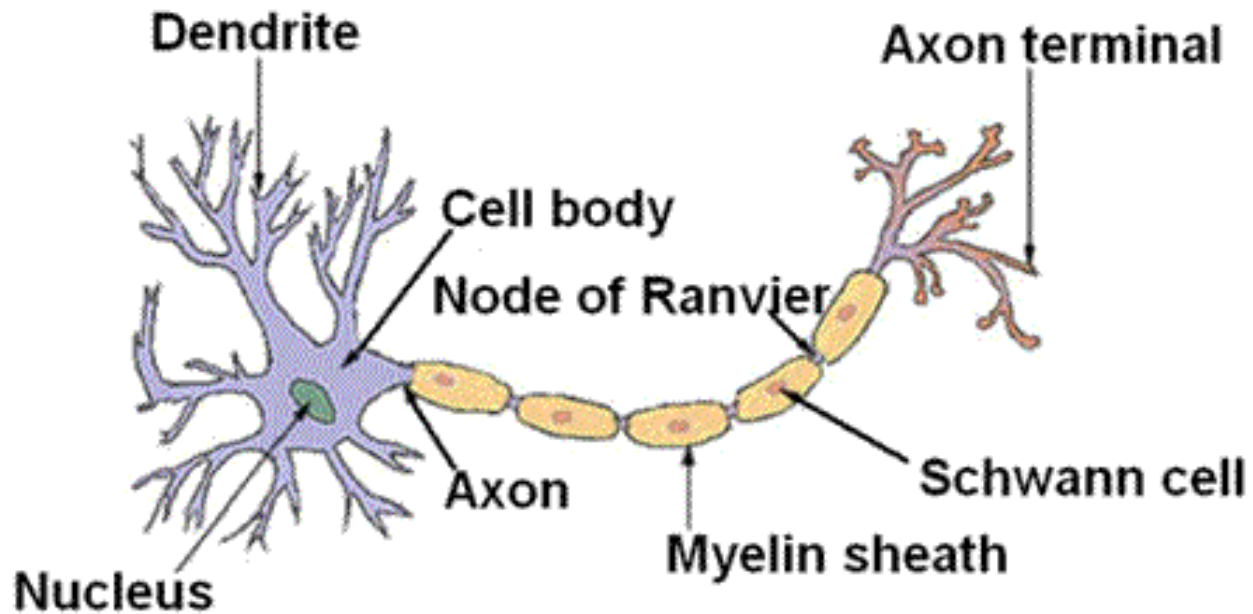


- Chapter 19 - The Nervous System
 - Section 1: How the Nervous System works
 - Section 2: Divisions of the Nervous system

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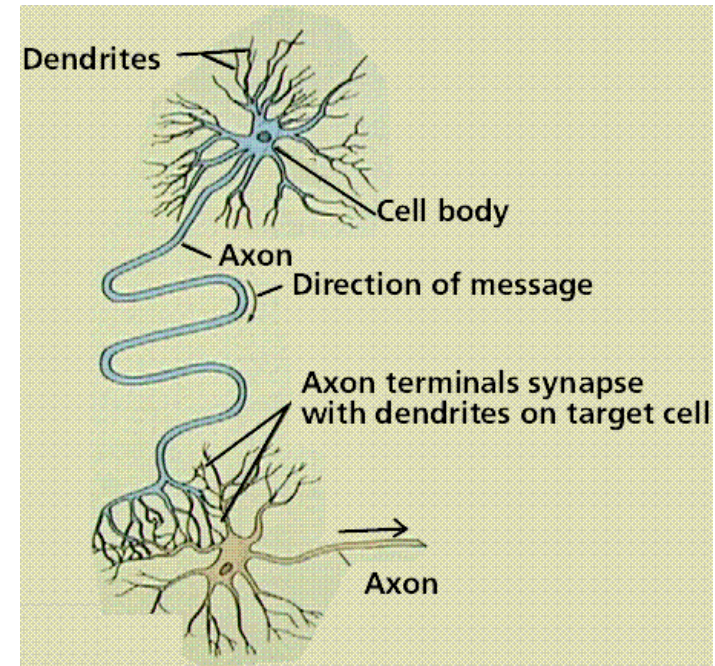


Example of a Neuron (nerve cell)




Parts of Neurons (nerve cells)

- **Cell body** - contains nucleus
- **Dendrites** - carry impulses to cell body
- **Axon** - carries impulses away from cell body
- **Synapse** = space between neurons
- **Neurotransmitters** = chemicals that carry impulses across synapses
- *Messages (nerve impulses) are unidirectional



Types of neurons & impulse pathway

- **Receptors**
 - cells that detect stimuli & transfer to sensory neurons
 - **Sensory neurons**
 - pick up stimuli & converts it into a nerve impulse
 - **Interneurons**
 - connect sensory to motor neurons (like translators)
 - Located in Spinal cord and brain
 - **Motor neurons**
 - send impulses to muscles or glands
 - **Effectors**
 - muscle or gland cells stimulated by motor neurons
- 

Divisions of the Nervous System

- **Central NS**

- Brain
- Spinal cord

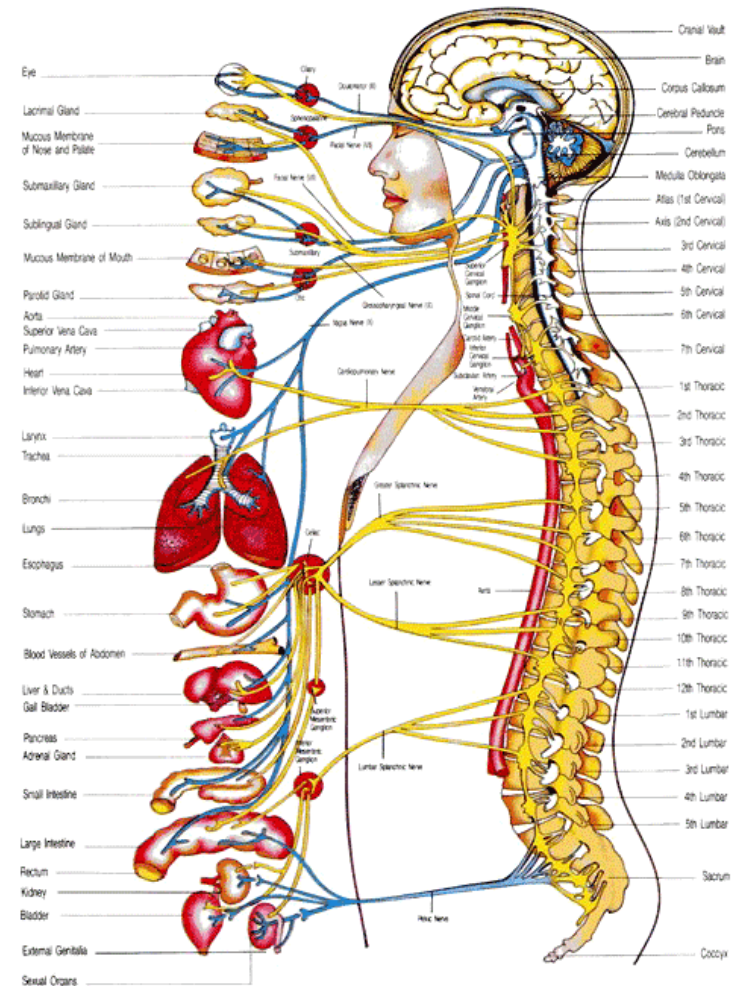
- **Peripheral NS** – nerves from spinal cord to the parts of the body

- **Autonomic NS**

- controls involuntary actions
- smooth muscles & glands;

- **Somatic NS**

- Control voluntary actions
- movement

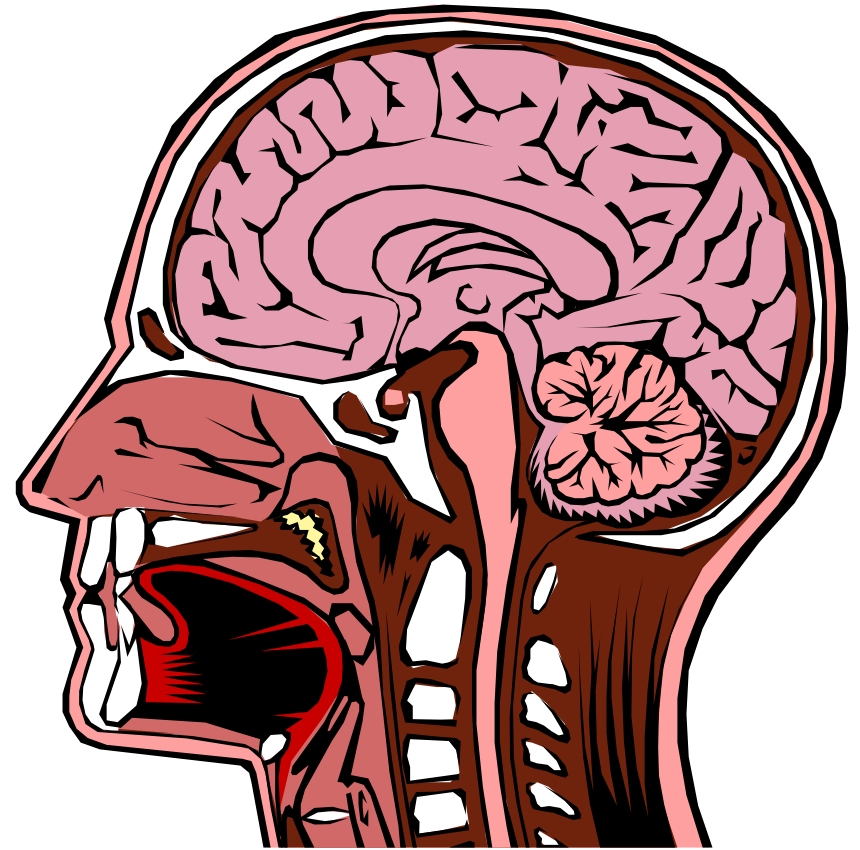


Brain

- A. **Cerebrum**- (thinking cap)
senses, memory, thinking,
reasoning, emotions, voluntary
muscles

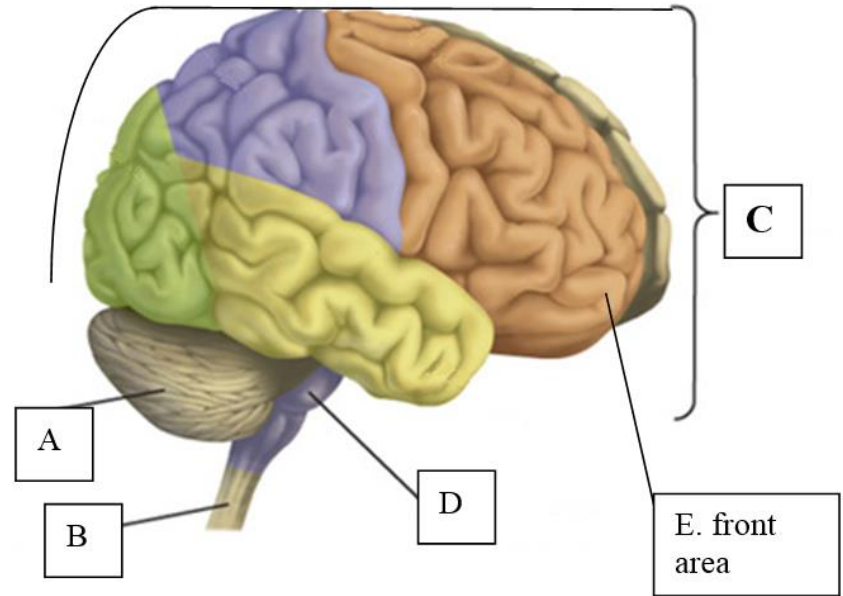
- B. **Cerebellum** – (little brain)
coordinates muscle movement,
balance, muscle tone

- C. **Brain Stem** (Medulla) -
heartbeat, breathing, blood
pressure, involuntary muscle
movements



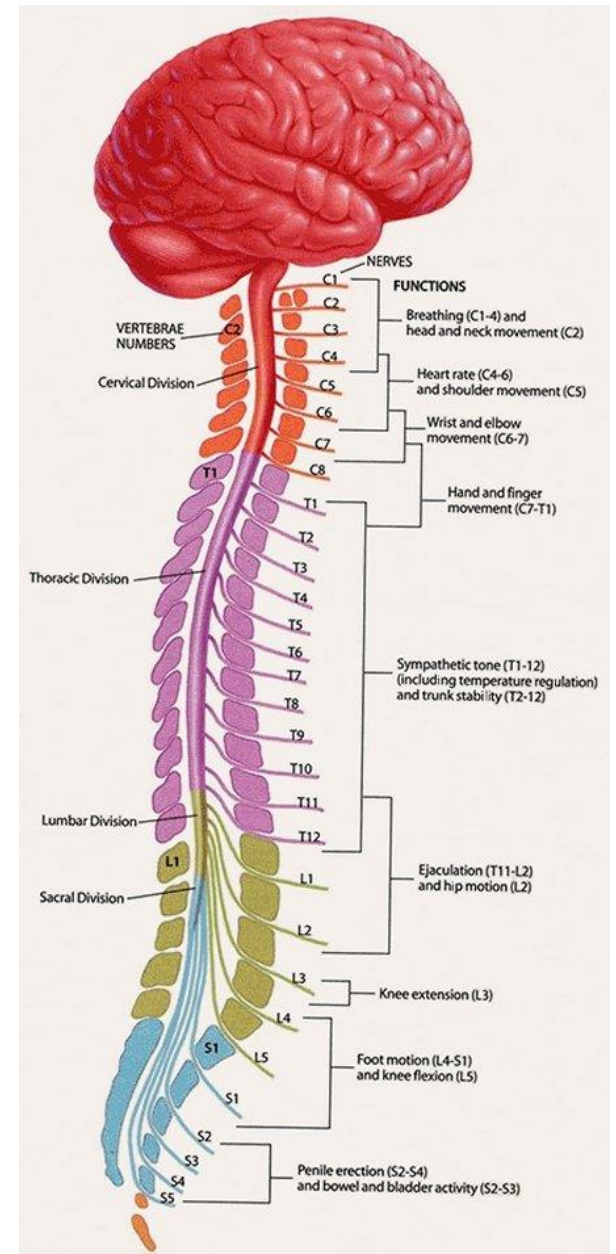
Brain – practice – can you label and define functions?

- A. Cerebellum
- B. Spinal cord
- C. Cerebrum
- D. Brain stem (medulla)
- E. Prefrontal cortex – CEO of the brain
controls planning and evaluating consequences



Other Brain Structures

- Cerebrospinal Fluid (CSF)
- Skull – protective bone plates that fuse together as a toddler ages
- [Meninges \(membranes\)](#)
- Spinal Cord
 - Link between brain and Peripheral NS
 - Responsible for reflexes



Reflexes

- Controlled by the spinal cord (no interpretation by the brain)
- **Involuntary** response to a stimulus
- **Protective** because it is so fast
- **reflex arc**
 - Receptor → Sensory neuron → Spinal cord (interneuron) → motor neuron of affected area



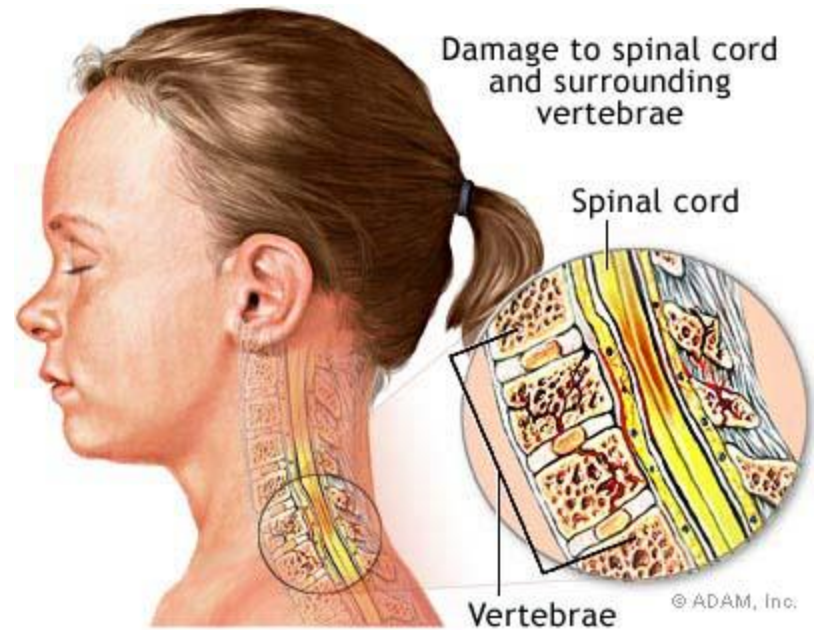
Nervous System Injuries

- Concussion

- Like a bruise
- Brain hits skull

- Spinal Cord Injuries

- Spinal cord is cut or crushed
- Causes paralysis





Brain Anatomy - Extended Learning

It is useful to understand the basic anatomy of the brain. The signs and symptoms of brain injury depend on which region of the brain is affected and how severely.

- **The Cerebrum** made up of four distinct lobes.

Each of these lobes has different functions, and some of these functions may overlap.

- **Frontal lobe** – Involved in motor function, problem solving, spontaneity, memory, language, initiation, judgment, impulse control, and social and sexual behavior
- **Temporal lobe** – Controls memory, hearing, and understanding of speech and allows a person to distinguish between sounds and smells
- **Parietal lobe** – Controls sensory comprehension, interpreting taste, touch, temperature, pain, movement and orientation
- **Occipital lobe** – Processes visual stimuli
- The cerebrum can be anatomically divided into two parts; the right and left hemispheres. The right hemisphere controls the left side of the body, and the left hemisphere controls the right side. This aspect of brain anatomy explains why stroke symptoms often only affect one side of the body.
- **The cerebellum** is located behind the brain stem. While the frontal lobe controls movement, the cerebellum “fine-tunes” movement. This area of the brain controls fine motor movement, balance, and the brain’s ability to determine limb position. A stroke in the cerebellum can lead to paralysis or “jerky” muscle movements.
- **The Brain Stem** is located at the top of the spinal column, the brain stem controls breathing, heart rate, blood pressure, and alertness. Brain stem strokes can disrupt breathing, causing sudden death.

