Quick Question

- Do you think your brain today is the same as it was when you were born? Why or why not?

Types of Neurons

- Sensory neurons
  - Information from sensory organs
- Motor neurons
  - Information from CNS to muscles/glands
- Interneurons
  - In the CNS, information from one neuron to another
Parts of the Neuron

- **Cell body**
  - Keeps the cell alive
- **Dendrites**
  - Receive messages
- **Axon**
  - Sends messages
  - Ends in the axon terminal
  - May have myelin sheath

Action Potential

- All-or-none firing response
- Can change the rate of impulses to increase strength
- Depolarization and repolarization

Synaptic Transmission

- Neurotransmitters cross the synaptic gap
- Key and lock
- Excitatory vs. inhibitory synapse
Studying the Human Brain

• Observing localized brain damage
• Transcranial magnetic stimulation (TMS)
• Electroencephalogram (EEG)
• Positron emission tomography (PET)
• Functional magnetic resonance imaging (fMRI)

Studying the Non-Human Brain

• Brain lesions
• Stimulation
• Electrical recording

Why do you think these methods are usually reserved for non-human animals?

Parasympathetic and Sympathetic Nervous Systems

• Sympathetic nervous system
  – Fight or flight
• Parasympathetic nervous system
  – Growth promoting, energy saving
Spinal Cord

- Pathway to the brain
- Organizes simple reflexes
- Pattern Generation

Brainstem

- Medulla
- Pons
  - Postural reflexes
  - Vital reflexes
- Midbrain
  - Species-typical movement patterns

Thalamus

- Relays sensory and motor signals
- Arousal of the brain

- Did you know that Michael J. Fox had surgery on his thalamus to help with his symptoms of Parkinson's Disease?
Cerebellum and Basil Ganglia

- Coordinate skilled movements
- Feedback
- Feed-forward

Limbic System

- Amygdala
  - Regulation of basic drives and emotions
- Hippocampus
  - Encoding certain memories

Hypothalamus

- Regulates the internal environment of the body
  - Influences the autonomic nervous system
  - Controls the release of certain hormones
  - Affects certain drive states, such as hunger and thirst
  - Helps regulate emotional states, such as fear and anger
Cerebral Cortex

- Frontal lobe
- Parietal lobe
- Temporal lobe
- Occipital lobe

Hemispheric Specialization

- Left Hemisphere
  - Language
- Right Hemisphere
  - Non-verbal, visuospatial information

Broca’s Area and Wernicke’s Area

- Broca’s area
  - Broca’s aphasia
- Wernicke’s area
  - Wernicke’s aphasia
Experience and the Brain

- If you use it, it will grow
- Neurons that fire together wire together
  - Hebbian synapse
  - Long-term potentiation

Hormones and the Brain

- Hormones vs. neurotransmitters
  - Snail mail vs. email
- Neurohormones

Drugs and the Brain

- Drugs vs. hormones
- Drugs and synaptic transmission
  - Do you know anyone who takes an antidepressant medication such as Zoloft or Prozac? These drugs block the re-uptake of the neurotransmitter serotonin
Assessment

• Take a minute to right down as many words as you can remember that relate to neurons without looking at your notes.