

How is the Nervous System Organized?


The Biology of the Mind

Module 3:

Neural and Hormonal Systems

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Class Objectives



- ☞ Understand the function and purpose of the nervous system
- ☞ Identify and define the structures of the neuron
- ☞ Identify and discuss the role of neurotransmitters on behavior

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What is the Nervous System?



- ☞ The Nervous System is the body's main processing

- ☞ This consists of structures and organs that facilitate communication in the body.

- This is the body's electrochemical communication circuitry

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The Neuron



☞ Nerve cells that handle information-processing functions.

- _____



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The Nervous System

Bundles of neurons communicating become systems



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The Nervous System



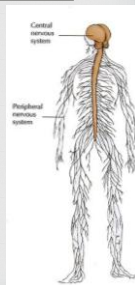
☞ Central Nervous System (CNS)

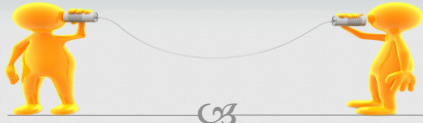
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☞ Peripheral Nervous System (PNS)

- The main function of the PNS is to connect the CNS to the limbs and organs

- _____





CNS Communication

The Spinal Cord

☞ The spinal cord transmits signals from the sensory organs, muscles and glands to the brain.

- Controls _____
- _____

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The spinal cord is like
a communication
superhighway
between the brain and
the rest of the body.

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Brain and spinal cord communication

☞ Sensory neurons

- _____

☞ _____

- Carry outgoing information brain and spinal cord to the muscles and glands

☞ Interneurons

- Neurons within the CNS that communicate internally and

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The parts of the neuron



1. _____ are specialized tree-like fibers that receive information from outside the neuron. (Listen)
2. The _____ relays the information down to the axon
3. The *Axon* _____ toward other neurons, muscles or glands. (Speak)
4. *Axon Terminal* is the _____

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The structure of a neuron

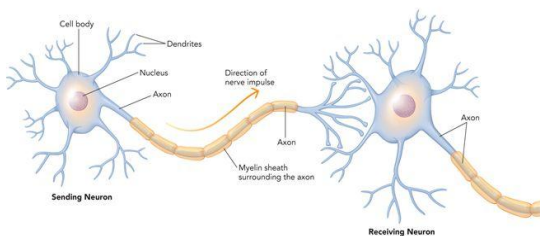


- CR The axon is covered by a _____, a layer of cells containing fat, encases and insulates most axons.
- By insulating the axons, myelin _____



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from the Axon terminal to the next neuron



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Once the information reaches the axon terminal, it is transmitted outside the cell by neurotransmitters, which reside in the axon terminal.

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How do Neurons Communicate?



- Electrical Communication
- Chemical Communication

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The Electrical Part

(_____)




☞ To transmit information to other neurons, a brief electrical current impulses through its axon.

☞ _____

- This current causes the neuron to "fire"

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Once the electrical impulse reaches a certain level of intensity (threshold), it fires and moves all the way down the axon.




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Synaptic transmission

- ☞ The Synapse is the _____
 - The synaptic gap or cleft
- ☞ Before an impulse can go across the synapse, it must be converted into a chemical message _____
- ☞ This is an electrochemical process

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Chemical Communication

- When a nerve impulse reaches the terminal button, it triggers the release of neurotransmitters from the synaptic vesicles
- ☞ They communicate to other neurons by _____

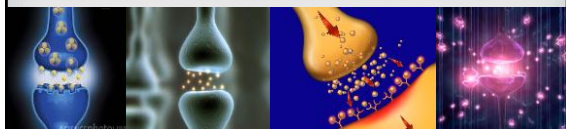
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Synaptic Transmission



☞ The neurotransmitters are like pieces of a puzzle, and the receptor sites on the next neuron are differently shaped spaces.

- _____



Types of Neurotransmitters

☞ _____ (ACh) usually stimulates the firing of neurons and is involved in _____

☞ Why do people have Botox treatments?



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Types of Neurotransmitters



☞ Gamma-aminobutyric acid (GABA) is the brain's brake pedal, helping to _____ and control the precision of the signal being carried from one neuron to the next.

- It is associated with _____

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Serotonin

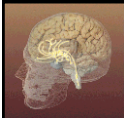


☞ Serotonin is involved in _____

- Abnormal levels may contribute to depression and OCD

☞ The antidepressant drug Prozac works by slowing down the reuptake of serotonin into terminal buttons, thereby increasing brain levels of serotonin (Little, Zhang, & Cook, 2006).

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Dopamine



☞ Dopamine helps to control voluntary movement and affects sleep, mood, attention, learning, feelings of reward and pleasure

- _____
- _____

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More Neurotransmitters!




☞ Norepinephrine helps _____

- Stimulated by stress, it is especially important for vigilance.

☞ Endorphins are natural opiates that are linked to pain control and pleasure

- _____

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How do drugs effect behavior?

Agonists versus Antagonists


☞ Agonists _____ the actions of a neurotransmitter

☞ Antagonists _____ the actions of a neurotransmitter

Agonist



Antagonist



Next Class...

☞

The structures and functions of the brain
