

KEY

Nervous System Review

- The nervous system can be divided into two main components:
 - CNS, which consists of the brain and spinal cord.
 - PNS, which consists of a sensory somatic nervous system and the autonomic.
- The basic unit of the nervous system is the neuron.
- Three kinds of neurons are the i) sensory, ii) motor and iii) neuron.
- The kind of neuron found only in the brain and spinal cord is the interneuron neuron.
- The nucleus of the neuron lies within the cell body of the nerve cell.
- The axon of a neuron carries a nerve impulse away from the cell body.
- Many neurons are insulated by a myelin sheath which is produced by Schwann cells.
- Myelin is whitish in color because it contains fatty cells/insulation. It is not a continuous sheath but is interrupted by spaces called nodes of Ranvier about every 1mm along the axon.
- To initiate a nerve impulse the neuron must be depolarized. The action potential can be caused by chemical or electrical stimulation.
- For a stimulus to cause depolarization, the strength of the stimulus must be at or above Threshold.
- A nerve impulse is of the same strength regardless of the stimulus, as long as it is above threshold. This characteristic demonstrates the All or None principle.
- Along a myelinated neuron, the nerve impulse jumps from Node to Node. This kind of nerve impulse is called saltatory action which results in faster conduction.
- Neurons use large amounts of energy because of the sodium potassium pump required to keep a neuron at -70mV at rest.

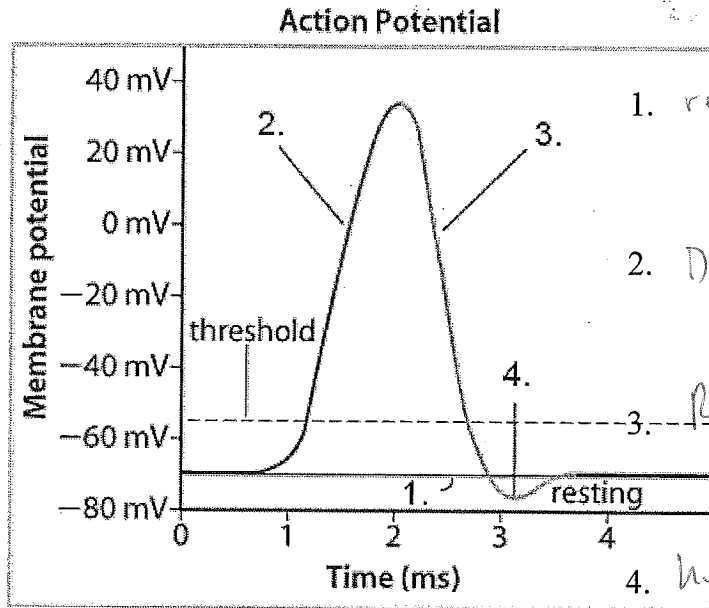
14. At resting potential, the neuron is kept in a polarized state by the sodium potassium pump moving 3 Na⁺ out / 2 K⁺ in.
15. During depolarization, sodium ions move inside the neuron through the open gates and cause the membrane to become positive.
16. repolarisation occurs when potassium ions move out of the neuron.
17. Resting potential is restored during the absolute refractory when sodium is pumped out and potassium is pumped in.
18. The gap between the axon terminal end of one neuron and the dendrite of the next neuron is called a synapse.
19. When a nerve impulse arrives at the end of an axon, it stimulates the release of a Neurotransmitter, the most common being acetylcholine. This substance diffuses across the synapse, stimulates the next dendrite and then is broken down by the enzyme cholinesterase.
20. A damaged neuron can be repaired if it has a neurolemma.
21. The direction of nerve impulse conduction is controlled by the _____
_____ ??
22. Draw a flow diagram to show the components of the reflex arc.

Sensory Receptor → sensory neuron → interneurons → motor neurons → effectors.

23. Neurons are grouped together to form nerves.
24. The brain is divided into three general regions: i) cerebrum which consists of two cerebral hemispheres, ii) midbrain and the iii) hindbrain which consists of the cerebellum and the medulla oblongata.
25. Which lobe in the cerebrum controls the following?
 i) analyzes visual information occipital
 ii) controls speech frontal
 iii) interprets hearing temporal
 iv) interprets sensations of touch parietal

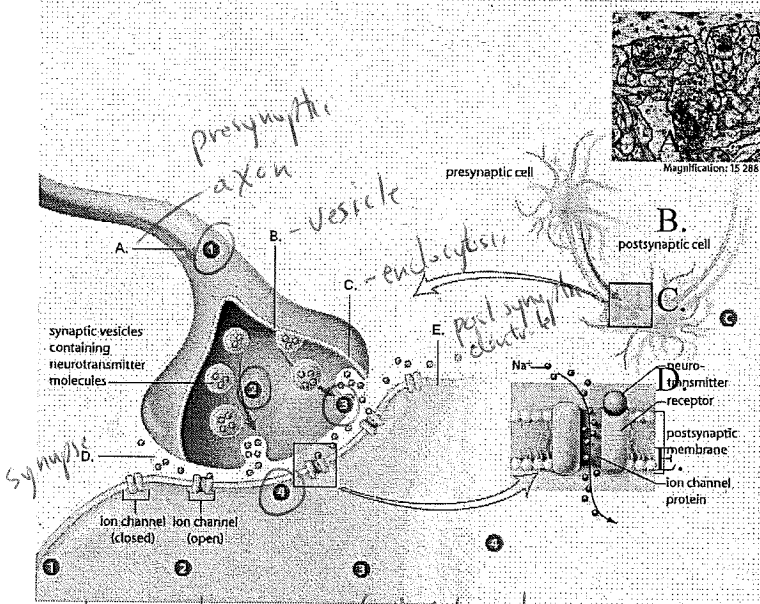
26. Give the part of the brain that controls the following:
- i) controls heartbeat and breathing rate medulla
 - ii) coordinates muscle activity and balance cerebellum
 - iii) controls higher mental processes frontal lobe
27. The membranes covering the brain are called meninges.
28. The ventricles of the brain and central cavity of the spinal cord are filled with cerebrospinal fluid
29. Neurons which transmit impulses from a sensory structure to the CNS pass through the dorsal root before they enter the spinal cord. The motor neurons which pass out of the spinal cord leave via the ventral root.
30. The peripheral nervous system consists of the somatic and autonomic systems.
31. The part of the PNS that speeds up the heart rate and breathing, dilates the pupils and redirects blood to the muscles is the sympathetic - autonomic
32. If you have been subjected to a "fight or flight" situation, the part of the autonomic system involved is the sympathetic. Epinephrine is the neurotransmitter that stimulates the nerves to respond. The system that brings you back to normal activity is the parasympathetic.
33. Stimulants such as caffeine and nicotine stimulate the sympathetic nervous system of the brain by mimicking, increasing the release of, or preventing the breakdown of epinephrine.

1. Label 1 through 4 on the following diagram and explain what is happening at each stage.



1. resting potential / polarized. Na^+/K^+ pump
3 Na^+ out / 2 K^+ in
2. Depolarization - Na^+ rush in
3. Repolarization - K^+ rush out
4. hyperpolarized - lots of K^+ out (overshoot) and some Cl^- in

2. Label A through E on the following diagram. What occurs during steps 1 through 4?



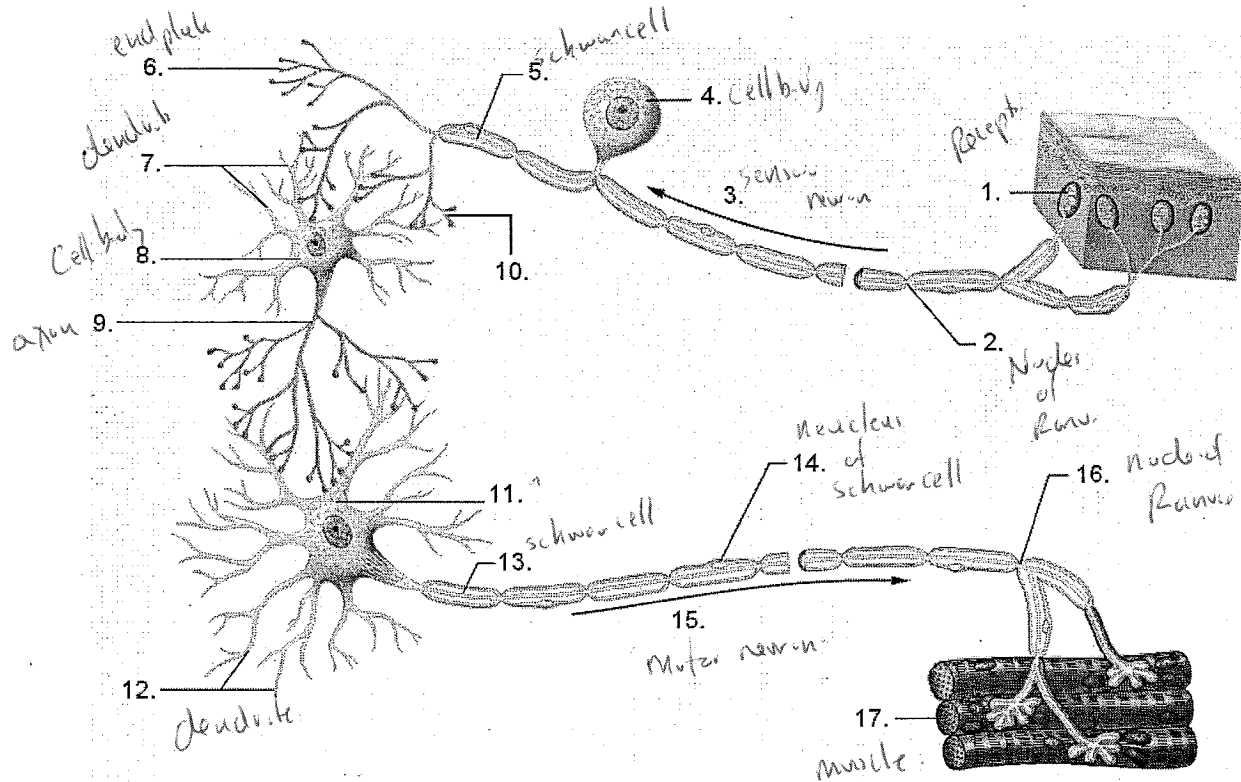
1. depolarization - wave of depolarization
2. vesicles with NT go to the endplate
3. exocytosis cause NT to release into synapse
4. NT attach to receptors on dendrite which cause Na^+ to rush in and depolarize the postsynaptic membrane

4. Fill in the appropriate neurotransmitter in the first column: norepinephrine, serotonin, dopamine, endorphins. Fill in the blanks to describe the function and effects of each neurotransmitter.

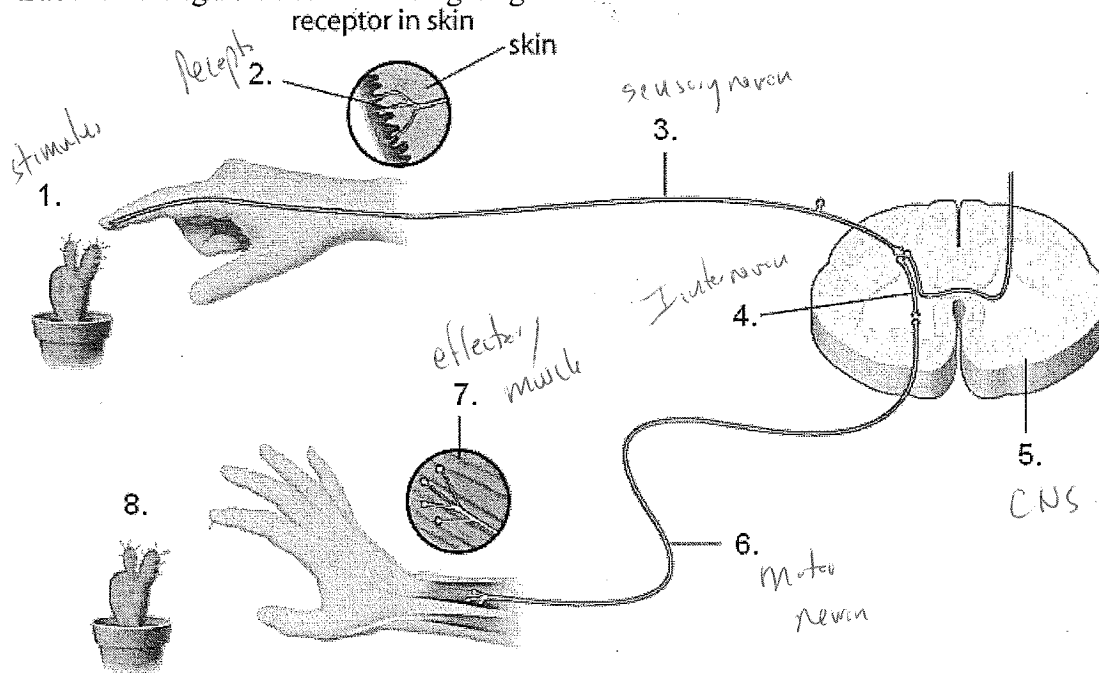
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Neurotransmitter	Function	Effects of abnormal production
Dopamine	<ul style="list-style-type: none"> affects the brain synapses in the control of body movements is linked to _____ of pleasure, such as eating 	<ul style="list-style-type: none"> excessive production linked to schizophrenia, a disorder in which the individual's perception of reality is greatly distorted inadequate production linked to _____ disease, a progressive disorder that destroys neurons, causing tremors, slurred speech, and other coordination problems
Serotonin	<ul style="list-style-type: none"> regulates _____ and sensory perception is involved in mood control 	<ul style="list-style-type: none"> inadequate amounts in the brain synapses linked to _____
Endorphins	<ul style="list-style-type: none"> act as natural _____ in synapses in the brain also affects emotional areas of the brain 	<ul style="list-style-type: none"> deficiency linked to an increased risk of _____
Norepinephrine	<ul style="list-style-type: none"> is used by the brain and some autonomic neurons complements the actions of the hormone epinephrine, which readies the body to respond to _____ or other stressful situations 	<ul style="list-style-type: none"> overproduction linked to high _____, anxiety, and insomnia deficiency linked to hunger cravings and _____

5. Label 1 through 17 on the following diagram.



6. Label 1 through 8 on the following diagram.



7. Label 1 through 10 on the following diagram. Describe what is occurring in steps A through E.

1. C

27. ~~E~~D

2. D

28. C

3. B

30. 3214

6. A

31. B

7. 9040

8. A

Diploma MC

13. A

20. B

24. 3256

26. 124

