

Human Physiological Systems

Name:

Nerves and Sense Organs

1. Briefly, list the components of the CNS and the PNS.
2. In the CNS, what is "white mater" and what is "gray mater"?
3. What is a ganglion, what is a nucleus, and how are they similar?
4. Briefly, describe the basic functions of the nervous system (sensation, response, integration, etc.).
5. Briefly, describe the following divisions (subdivisions) of the nervous system:
 - somatic nervous system:
 - autonomic nervous system:
 - enteric nervous system:

6. Define the following features of a neuron/neural tissue:

synapse:

axon hillock:

node of Ranvier:

axon:

dendrite:

7. Briefly, describe the following types of neurons:

Unipolar:

Bipolar:

Multipolar:

8. Provide a location (CNS or PNS) and basic function for the following glial (neuroglia) cells:

Astrocyte:

Oligodendrocyte:

Microglia:

Ependymal cell:

Satellite cell:

Schwann cell:

9. What is myelin? What is the function of myelin? Name at least two diseases associated with the inflammation, destruction, or removal (demyelinating) of myelin.

10. Electrically active cell membranes can possess a complex array of ion channels. These can be voltage regulated (gated), ligand gated, mechanically gated and temperature gated (other stimuli control ion movement through channels as well). Therefore, the number and magnitude of ion channel activation can differ substantially within and between neurons. Despite the complex nature of neuron function, we can partially understand by defining the following:

electrochemical exclusion:

size exclusion:

nonspecific channel:

ligand-gated channel:

mechanically-gated channel:

voltage-gated channel:

leakage channel (leaky ion channel):

11. Define the following in terms of the action potential of neurons (similar processes occur in muscle):

membrane potential:

resting membrane potential:

depolarization:

repolarization:

12. What is the difference between an excitatory postsynaptic potential (EPSP) and an inhibitory postsynaptic potential (IPSP)?

13. Briefly, describe the difference between **spatial summation** and **temporal summation**.

14. Describe the features of the following neurotransmitter types (neurotransmitter systems, Table 12.3 in OpenStax textbook). Be sure to include the neurotransmitters used, receptors, mode of elimination, and likely postsynaptic effect.

cholinergic:

amino acids:

biogenic amines:

neuropeptides:

15. Very briefly, describe the following sensory receptors and receptor types:

free nerve ending:

encapsulated ending:

photoreceptor:

proprioceptor:

osmoreceptor:

chemoreceptor:

nociceptor:

mechanoreceptor:

thermoreceptor:

16. Briefly, describe the sympathetic and parasympathetic divisions of the autonomic nervous system. In broad terms, what type of activity is associated with activation of each division?

17. Neurotransmitters used for the sympathetic and parasympathetic divisions can result in stimulatory or inhibitory effects on the target tissue. This diversity of response to a stimulus is mediated by acetylcholine and/or norepinephrine (epinephrine) as the neurotransmitter and variation in the receptors at the postsynaptic neuron or variation of receptors at the target tissue. Provide some brief information about the following (hint: Table 15.1, about page 663, of the OpenStax textbook):

Cholinergic Receptors (bind acetylcholine)

nicotinic receptor:

muscarinic receptor:

Adrenergic Receptors (bind norepinephrine/epinephrine)

alpha-adrenergic receptor:

beta-adrenergic receptor: