A&P Key Terms 12 The Nervous System

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4. Chapter: A&P Key Terms 12 The Nervous System

1. A&P Key Terms 12 The Nervous System Questions

absolute refractory period	time during an action period when another action potential cannot be generated because the voltage-gated Na+ channel is inactivated
action potential	change in voltage of a cell membrane in response to a stimulus that results in transmission of an electrical signal; unique to neurons and muscle fibers
activation gate	part of the voltage-gated Na+ channel that opens when the membrane voltage reaches threshold
astrocyte	glial cell type of the CNS that provides support for neurons and maintains the blood-brain barrier
autonomic nervous system (ANS)	functional division of the nervous system that is responsible for homeostatic reflexes that coordinate control of cardiac and smooth muscle, as well as glandular tissue
axon hillock	tapering of the neuron cell body that gives rise to the axon
axon segment	single stretch of the axon insulated by myelin and bounded by nodes of Ranvier at either end (except for the first, which is after the initial segment, and the last, which is followed by the axon terminal)
axon terminal	end of the axon, where there are usually several branches extending toward the target cell
axon	single process of the neuron that carries an electrical signal (action potential) away from the cell body toward a target cell
axoplasm	cytoplasm of an axon, which is different in composition than the cytoplasm of the neuronal cell body
biogenic amine	class of neurotransmitters that are enzymatically derived from amino acids but no longer contain a carboxyl group
bipolar	shape of a neuron with two processes extending from the neuron cell bodythe axon and one dendrite
blood-brain barrier (BBB)	physiological barrier between the circulatory system and the central nervous system that establishes a privileged blood supply, restricting the flow of substances into the CNS
brain	the large organ of the central nervous system composed of white and gray matter, contained within the cranium and continuous with the spinal cord

central nervous system (CNS)	anatomical division of the nervous system located within the cranial and vertebral cavities, namely the brain and spinal cord
cerebral cortex	outermost layer of gray matter in the brain, where conscious perception takes place
cerebrospinal fluid (CSF)	circulatory medium within the CNS that is produced by ependymal cells in the choroid plexus filtering the blood
chemical synapse	connection between two neurons, or between a neuron and its target, where a neurotransmitter diffuses across a very short distance
cholinergic system	neurotransmitter system of acetylcholine, which includes its receptors and the enzyme acetylcholinesterase
choroid plexus	specialized structure containing ependymal cells that line blood capillaries and filter blood to produce CSF in the four ventricles of the brain
continuous conduction	slow propagation of an action potential along an unmyelinated axon owing to voltage-gated Na+ channels located along the entire length of the cell membrane
dendrite	one of many branchlike processes that extends from the neuron cell body and functions as a contact for incoming signals (synapses) from other neurons or sensory cells
depolarization	change in a cell membrane potential from rest toward zero
effector protein	enzyme that catalyzes the generation of a new molecule, which acts as the intracellular mediator of the signal that binds to the receptor
electrical synapse	connection between two neurons, or any two electrically active cells, where ions flow directly through channels spanning their adjacent cell membranes
electrochemical exclusion	principle of selectively allowing ions through a channel on the basis of their charge
enteric nervous system (ENS)	neural tissue associated with the digestive system that is responsible for nervous control through autonomic connections
ependymal cell	glial cell type in the CNS responsible for producing cerebrospinal fluid

excitable membrane	cell membrane that regulates the movement of ions so that an electrical signal can be generated
excitatory postsynaptic potential (EPSP)	graded potential in the postsynaptic membrane that is the result of depolarization and makes an action potential more likely to occur
G protein	guanosine triphosphate (GTP) hydrolase that physically moves from the receptor protein to the effector protein to activate the latter
ganglion	localized collection of neuron cell bodies in the peripheral nervous system
gated	property of a channel that determines how it opens under specific conditions, such as voltage change or physical deformation
generator potential	graded potential from dendrites of a unipolar cell which generates the action potential in the initial segment of that cell's axon
glial cell	one of the various types of neural tissue cells responsible for maintenance of the tissue, and largely responsible for supporting neurons
graded potential	change in the membrane potential that varies in size, depending on the size of the stimulus that elicits it
gray matter	regions of the nervous system containing cell bodies of neurons with few or no myelinated axons; actually may be more pink or tan in color, but called gray in contrast to white matter
inactivation gate	part of a voltage-gated Na+ channel that closes when the membrane potential reaches +30 mV
inhibitory postsynaptic potential (IPSP)	graded potential in the postsynaptic membrane that is the result of hyperpolarization and makes an action potential less likely to occur
initial segment	first part of the axon as it emerges from the axon hillock, where the electrical signals known as action potentials are generated
integration	nervous system function that combines sensory perceptions and higher cognitive functions (memories, learning, emotion, etc.) to produce a response
ionotropic receptor	neurotransmitter receptor that acts as an ion channel gate, and opens by the binding of the neurotransmitter
leakage channel	ion channel that opens randomly and is not gated to a specific event, also known as a non-gated channel

	specific event, also known as a non-gated channel
ligand-gated channels	another name for an ionotropic receptor for which a neurotransmitter is the ligand
lower motor neuron	second neuron in the motor command pathway that is directly connected to the skeletal muscle
mechanically gated channel	ion channel that opens when a physical event directly affects the structure of the protein
membrane potential	distribution of charge across the cell membrane, based on the charges of ions
metabotropic receptor	neurotransmitter receptor that involves a complex of proteins that cause metabolic changes in a cell
microglia	glial cell type in the CNS that serves as the resident component of the immune system
multipolar	shape of a neuron that has multiple processesthe axon and two or more dendrites
muscarinic receptor	type of acetylcholine receptor protein that is characterized by also binding to muscarine and is a metabotropic receptor
myelin sheath	lipid-rich layer of insulation that surrounds an axon, formed by oligodendrocytes in the CNS and Schwann cells in the PNS; facilitates the transmission of electrical signals
myelin	lipid-rich insulating substance surrounding the axons of many neurons, allowing for faster transmission of electrical signals
nerve	cord-like bundle of axons located in the peripheral nervous system that transmits sensory input and response output to and from the central nervous system
neuron	neural tissue cell that is primarily responsible for generating and propagating electrical signals into, within, and out of the nervous system
neuropeptide	neurotransmitter type that includes protein molecules and shorter chains of amino acids
neurotransmitter	chemical signal that is released from the synaptic end bulb of a neuron to cause a change in the target cell
nicotinic receptor	type of acetylcholine receptor protein that is characterized by also binding to nicotine and is an ionotropic receptor

	ionotropic receptor
node of Ranvier	gap between two myelinated regions of an axon, allowing for strengthening of the electrical signal as it propagates down the axon
nonspecific channel	channel that is not specific to one ion over another, such as a nonspecific cation channel that allows any positively charged ion across the membrane
nucleus	in the nervous system, a localized collection of neuron cell bodies that are functionally related; a "center" of neural function
oligodendrocyte	glial cell type in the CNS that provides the myelin insulation for axons in tracts
peripheral nervous system (PNS)	anatomical division of the nervous system that is largely outside the cranial and vertebral cavities, namely all parts except the brain and spinal cord
postsynaptic potential (PSP)	graded potential in the postsynaptic membrane caused by the binding of neurotransmitter to protein receptors
precentral gyrus of the frontal cortex	region of the cerebral cortex responsible for generating motor commands, where the upper motor neuron cell body is located
process	in cells, an extension of a cell body; in the case of neurons, this includes the axon and dendrites
propagation	movement of an action potential along the length of an axon
receptor potential	graded potential in a specialized sensory cell that directly causes the release of neurotransmitter without an intervening action potential
refractory period	time after the initiation of an action potential when another action potential cannot be generated
relative refractory period	time during the refractory period when a new action potential can only be initiated by a stronger stimulus than the current action potential because voltage-gated K+ channels are not closed
repolarization	return of the membrane potential to its normally negative voltage at the end of the action potential
resistance	property of an axon that relates to the ability of particles to diffuse through the cytoplasm; this is inversely proportional to the fiber diameter

response	nervous system function that causes a target tissue (muscle or gland) to produce an event as a consequence to stimuli
resting membrane potential	the difference in voltage measured across a cell membrane under steady-state conditions, typically -70 mV
Schwann cell	glial cell type in the PNS that provides the myelin insulation for axons in nerves
saltatory conduction	quick propagation of the action potential along a myelinated axon owing to voltage-gated Na+ channels being present only at the nodes of Ranvier
satellite cell	glial cell type in the PNS that provides support for neurons in the ganglia
sensation	nervous system function that receives information from the environment and translates it into the electrical signals of nervous tissue
size exclusion	principle of selectively allowing ions through a channel on the basis of their relative size
soma	in neurons, that portion of the cell that contains the nucleus; the cell body, as opposed to the cell processes (axons and dendrites)
somatic nervous system (SNS)	functional division of the nervous system that is concerned with conscious perception, voluntary movement, and skeletal muscle reflexes
spatial summation	combination of graded potentials across the neuronal cell membrane caused by signals from separate presynaptic elements that add up to initiate an action potential
spinal cord	organ of the central nervous system found within the vertebral cavity and connected with the periphery through spinal nerves; mediates reflex behaviors
stimulus	an event in the external or internal environment that registers as activity in a sensory neuron
summate	to add together, as in the cumulative change in postsynaptic potentials toward reaching threshold in the membrane, either across a span of the membrane or over a certain amount of time
synapse	narrow junction across which a chemical signal passes from neuron to the next, initiating a new electrical signal in the target cell

synaptic cleft	small gap between cells in a chemical synapse where neurotransmitter diffuses from the presynaptic element to the postsynaptic element
synaptic end bulb	swelling at the end of an axon where neurotransmitter molecules are released onto a target cell across a synapse
temporal summation	combination of graded potentials at the same location on a neuron resulting in a strong signal from one input
thalamus	region of the central nervous system that acts as a relay for sensory pathways
thermoreceptor	type of sensory receptor capable of transducing temperature stimuli into neural action potentials
threshold	membrane voltage at which an action potential is initiated
tract	bundle of axons in the central nervous system having the same function and point of origin
unipolar	shape of a neuron which has only one process that includes both the axon and dendrite
upper motor neuron	first neuron in the motor command pathway with its cell body in the cerebral cortex that synapses on the lower motor neuron in the spinal cord
ventricle	central cavity within the brain where CSF is produced and circulates
voltage-gated channel	ion channel that opens because of a change in the charge distributed across the membrane where it is located
white matter	regions of the nervous system containing mostly myelinated axons, making the tissue appear white because of the high lipid content of myelin