#### Juliens Primer of Drug Action 14th Edition Advokat Test Bank

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- 1. The two main divisions of the human nervous system are the:
  - A) central and peripheral.
  - B) central nervous system and diencephalon.
  - C) diencephalon and telencephalon.
  - D) myelencephalon and metencephalon.
- 2. What component of the human nervous system is known as the "information highway of the body"?
  - A) midbrain
  - B) spinal cord
  - C) central nervous system
  - D) peripheral nervous system
- 3. All of the following are functions of the spinal cord EXCEPT to:
  - A) organize motor outflow to muscles.
  - B) carry sensory information from the skin.
  - C) provide autonomic control of vital body functions.
  - D) regulate sleep and wake states.
- 4. Which of the following statements is NOT a function of the spinal cord as it relates to the body, that is, skin, muscles, joints, and internal organs?
  - A) The spinal cord carries sensory information from the body to the brain.
  - B) The spinal cord carries motor information from the brain to the body.
  - C) The spinal cord modulates sensory information en route from the body to the brain.
  - D) The spinal cord initiates motor commands to the body.
- 5. All of the following are considered primary divisions of the brain EXCEPT the:
  - A) hindbrain.
  - B) mesencephalon.
  - C) diencephalon.
  - D) forebrain.
- 6. The two subdivisions of the hindbrain are the:
  - A) myelencephalon and diencephalon.
  - B) myelencephalon and metencephalon.
  - C) diencephalon and telencephalon.
  - D) telencephalon and metencephalon.

- 7. The two subdivisions of the forebrain are the:
  - A) myelencephalon and diencephalon.
  - B) myelencephalon and metencephalon.
  - C) diencephalon and telencephalon.
  - D) telencephalon and metencephalon.
- 8. The brainstem consists of the following nuclei EXCEPT the:
  - A) midbrain.
  - B) cerebellum.
  - C) pons.
  - D) medulla.
- 9. The brain stem is involved in all of the following functions EXCEPT:
  - A) attention.
  - B) filtering.
  - C) arousal.
  - D) behavioral alerting (vigilance).
- 10. The diencephalon includes all of the following EXCEPT:
  - A) hypothalamus.
  - B) pituitary gland.
  - C) subthalamus.
  - D) cerebrum.
- 11. The cerebellum is important for:
  - A) blood pressure.
  - B) respiration.
  - C) movement and posture.
  - D) sleep and wake states.
- 12. The term *ataxia* refers to:
  - A) increased fatigue.
  - B) increased respiration.
  - C) decreased respiration.
  - D) decreased coordination.

- 13. Danika was recently in a car accident and received a blow to the back of the head. She now exhibits ataxia when she walks, which suggests that there has been further damage to her:
  - A) hypothalamus.
  - B) cerebellum.
  - C) amygdala.
  - D) tectum.

#### 14. The two nuclei within the midbrain are the:

- A) tectum and tegmentum.
- B) tectum and ventral tegmental area.
- C) substantia nigra and ventral tegmental area.
- D) tegmentum and substantia nigra.
- 15. The "roof" of the midbrain is known as the:
  - A) cerebellum.
  - B) tegmentum.
  - C) substantia nigra.
  - D) tectum.
- 16. The \_\_\_\_\_\_ is part of the limbic system and contains dopamine.
  - A) tectum
  - B) tegmentum
  - C) substantia nigra
  - D) ventral tegmental area
- 17. The "reward circuit" in the brain is the:
  - A) tectum.
  - B) tegmentum.
  - C) substantia nigra.
  - D) ventral tegmental area.
- 18. The thalamus and hypothalamus are the two subdivisions of the:
  - A) myelencephalon.
  - B) metencephalon.
  - C) diencephalon.
  - D) telencephalon.

- 19. All of the following are hypothalamic functions EXCEPT:
  - A) motor control.
  - B) body temperature regulation.
  - C) drinking regulation.
  - D) sexual behavior.
- 20. Releasing factors are produced by the:
  - A) substantia nigra.
  - B) ventral tegmental area.
  - C) cerebellum.
  - D) hypothalamus.
- 21. The \_\_\_\_\_\_ relays sensory signals to the cortex.
  - A) thalamus
  - B) hypothalamus
  - C) spinal cord
  - D) cerebellum
- 22. The relay station between multiple subcortical areas and the cerebral cortex is the:
  - A) hypothalamus.
  - B) thalamus.
  - C) amygdala.
  - D) basal ganglia.
- 23. The basal ganglia and the limbic system are the two subdivisions of the:
  - A) myelencephalon.
  - B) metencephalon.
  - C) diencephalon.
  - D) telencephalon.
- 24. All of the following are the major structures of the basal ganglia EXCEPT for the:
  - A) globus pallidus.
  - B) thalamus.
  - C) putamen.
  - D) caudate nucleus.

- 25. The main function of the basal ganglia is:
  - A) regulating sleep and wake states.
  - B) gating of sensory information.
  - C) integration of movement.
  - D) modulating emotions.
- 26. The major structures of the basal ganglia are sometimes collectively referred to as the:
  - A) corpus callosum.
  - B) corpus striatum.
  - C) corpus christi.
  - D) motor nuclei.
- 27. Which brain region is involved in emotional processing?
  - A) amygdala
  - B) thalamus
  - C) hypothalamus
  - D) hippocampus
- 28. The hypothalamus controls the following functions EXCEPT:
  - A) eating.
  - B) drinking.
  - C) body temperature.
  - D) sensation.
- 29. The hypothalamus is a motivating force behind all the following behaviors, EXCEPT:
  - A) the drive to eat.
  - B) the drive to drink.
  - C) the drive for sex.
  - D) the rage response.
- 30. The second major subdivision of the telencephalon is the:
  - A) limbic system.
  - B) pons.
  - C) cerebellum.
  - D) medulla.

- 31. Which of the following is NOT a member of the limbic system?
  - A) hypothalamus
  - B) amygdala
  - C) hippocampus
  - D) dopamine-rich reward centers
- 32. The cingulate cortex is responsible for:
  - A) integrating sensory, motor, and emotional information.
  - B) regulating heart rate, blood pressure, and respiration.
  - C) motivating learning and facing challenges.
  - D) monitoring empathy, fairness, and social context.
- 33. The anterior cingulate cortex is responsible for:
  - A) integrating sensory, motor, and emotional information.
  - B) regulating heart rate, blood pressure, and respiration.
  - C) motivating learning and facing challenges.
  - D) monitoring empathy, fairness, and social context.
- 34. The posterior cingulate cortex is responsible for:
  - A) integrating sensory, motor, and emotional information.
  - B) regulating heart rate, blood pressure, and respiration.
  - C) motivating learning and facing challenges.
  - D) monitoring empathy, fairness, and social context.
- 35. All of the following are the four major lobes of the cerebral cortex EXCEPT:
  - A) frontal.
  - B) temporal.
  - C) parietal.
  - D) orbital.
- 36. The occipital cortex is responsible for:
  - A) hearing
  - B) vision
  - C) working memory
  - D) sensory perception

- 37. The parietal cortex is responsible for:
  - A) hearing.
  - B) vision.
  - C) working memory.
  - D) sensory perception.
- 38. The temporal cortex is responsible for:
  - A) hearing.
  - B) vision.
  - C) working memory.
  - D) sensory perception.
- 39. The frontal cortex is responsible for:
  - A) hearing.
  - B) vision.
  - C) working memory.
  - D) sensory perception.
- 40. All of the following are tasks related to the dorsal-lateral prefrontal cortex EXCEPT:
  - A) planning.
  - B) executive functions.
  - C) working memory.
  - D) sensory perception.
- 41. All of the following are tasks related to the dorsal-lateral prefrontal cortex EXCEPT:
  - A) decision making.
  - B) emotion regulation.
  - C) working memory.
  - D) cognitive flexibility.
- 42. The ventral-lateral prefrontal cortex is responsible for:
  - A) motor control.
  - B) evaluating rewards.
  - C) working memory.
  - D) motivation and emotions.

- 43. The insular cortex is known to process the sense of:
  - A) ventral-lateral prefrontal cortex.
  - B) dorsal-lateral prefrontal cortex.
  - C) insular cortex.
  - D) temporal cortex.
- 44. Von Economo neurons are located in the:
  - A) ventral-lateral prefrontal cortex.
  - B) dorsal-lateral prefrontal cortex.
  - C) insular cortex.
  - D) temporal cortex.
- 45. The Human Connectome Project is an investigation of the connections between:
  - A) romantic relationships.
  - B) social groups.
  - C) memory and language.
  - D) various brain regions.

46. The basic cellular unit of the central nervous system is the:

- A) nerve.
- B) tract.
- C) axon.
- D) neuron.
- 47. The two main cell types in the central nervous system are:
  - A) astrocytes and oligodendrocytes.
  - B) neurons and glial cells.
  - C) glial cells and microglial cells.
  - D) ependymal and microglial cells.
- 48. Which of the following roles best describes glial cells?
  - A) support and protection
  - B) relay sensory signals
  - C) emotional processing
  - D) memory processing

- 49. Which glial cell provides structural support to the central nervous system?
  - A) astrocytes
  - B) oligodendrocytes
  - C) ependymal cells
  - D) microglial cells
- 50. Which glial cell forms the myelin sheath in the central nervous system?
  - A) astrocytes
  - B) oligodendrocytes
  - C) ependymal cells
  - D) microglial cells
- 51. All of the following are roles of astrocytes EXCEPT for those that:
  - A) provide nutrients.
  - B) maintain the extracellular environment.
  - C) regulate neurotransmitter reuptake.
  - D) clean up waste products.
- 52. All of the following are roles of astrocytes EXCEPT:
  - A) modulate signal transmission
  - B) form the myelin sheath
  - C) synapse formation
  - D) promote recovery after injury
- 53. All of the following are roles of microglia EXCEPT for:
  - A) pruning neurons.
  - B) forming the myelin sheath.
  - C) cleaning up damaged cells.
  - D) cleaning up debris.
- 54. Extensive pruning of neurons is characteristic of disorders, such as schizophrenia and Alzheimer's disease. This is likely to involve:
  - A) astrocytes.
  - B) oligodendrocytes.
  - C) ependymal cells.
  - D) microglial cells.

- 55. The nucleus of a neural cell is found in the:
  - A) soma.
  - B) dendrite.
  - C) axon.
  - D) presynaptic terminal.

### 56. The organelles of a neuron is found in the:

- A) soma.
- B) dendrite.
- C) axon.
- D) presynaptic terminal.
- 57. In a neuron, the dendrites \_\_\_\_\_\_ signals, while the axon \_\_\_\_\_\_ signals.
  - A) delay; amplifies
  - B) amplify; delays
  - C) receive; transmits
  - D) transmit receives
- 58. Which of the following indicates the correct order of information traveling through a neuron?
  - A) Axon; soma; dendrites
  - B) Soma; dendrites; axon
  - C) Soma; axon; dendrites
  - D) Dendrites; soma; axon
- 59. The myelin sheath \_\_\_\_\_\_ signals.
  - A) delays
  - B) speeds up
  - C) blocks
  - D) amplifies
- 60. The myelin sheath covers the:
  - A) soma.
  - B) dendrites.
  - C) axon.
  - D) axon terminal.

- 61. A single neuron may have many \_\_\_\_\_ and only one \_\_\_\_\_.
  - A) axons; dendrite
  - B) dendrites; axon
  - C) myelin sheaths; soma
  - D) somas; myelin sheath
- 62. Neurogenesis refers to:
  - A) formation of new neurons.
  - B) rejuvenation of old neurons
  - C) coating of the myelin sheath
  - D) formation of a new axon
- 63. The conduction velocity of two neurons was compared. The action potential was conducted much faster in Neuron A than in Neuron B. These data suggest that:
  - A) Neuron A is shorter than Neuron B.
  - B) Neuron B must possess a myelin sheath.
  - C) Neuron B is found in the spinal cord.
  - D) Neuron A possesses a myelin sheath.
- 64. Synaptic vesicles contain:
  - A) organelles.
  - B) microglia.
  - C) neurotransmitters.
  - D) enzymes
- 65. In neurophysiology, exocytosis applies to:
  - A) the neural cell body.
  - B) the presynaptic terminal of the neural cell.
  - C) the vesicles of the neural cell.
  - D) both the presynaptic terminal and the vesicles of the neural cell.
- 66. Exocytosis is initially triggered by:
  - A) the synapse.
  - B) enzymes.
  - C) neurotransmitters.
  - D) the action potential.

- 67. When vesicles fuse with the presynaptic membrane, \_\_\_\_\_\_ occurs, that is, the release of the neurotransmitter into the synapse.
  - A) endocytosis
  - B) exocytosis
  - C) synaptic transmission
  - D) transport
- 68. Neurotransmitters are stored in the:
  - A) presynaptic terminal.
  - B) postsynaptic terminal.
  - C) soma.
  - D) dendrites.
- 69. Which of the following indicates the correct order of information traveling between two neurons?
  - A) Synaptic cleft, dendrite terminal, axon terminal
  - B) Synaptic cleft, axon terminal, dendrite terminal
  - C) Axon terminal, synaptic cleft, dendrite terminal
  - D) Dendrite terminal, synaptic cleft, axon terminal
- 70. Which of the following indicates the correct order of information traveling between two neurons?
  - A) Receptor attachment, diffuse across synapse, exocytosis
  - B) Exocytosis, diffuse across synapse, receptor attachment
  - C) Exocytosis, receptor attachment, diffuse across synapse
  - D) Diffuse across synapse, receptor attachment, exocytosis
- 71. Synaptic transmission is a(n) \_\_\_\_\_ process, and the action potential is a(n) \_\_\_\_\_ process.
  - A) diffusion; enzymatic
  - B) enzymatic; diffusion
  - C) electrical; chemical
  - D) chemical; electrical
- 72. One of the important roles that autoreceptors have in synaptic transmission is to:
  - A) reduce neurotransmitters.
  - B) increase neurotransmitters.
  - C) slow the action potential.
  - D) speed up the action potential.

- 73. Autoreceptors are located:
  - A) inside the presynaptic terminal.
  - B) outside the presynaptic terminal.
  - C) inside the postsynaptic terminal.
  - D) outside the postsynaptic terminal.
- 74. Autoreceptors also function to:
  - A) enhance synthesis and release of neurotransmitter.
  - B) reduce the synthesis and additional release of neurotransmitter.
  - C) reduce binding at the postsynaptic receptor and produce inhibition at the synapse.
  - D) augment synaptic transmission.
- 75. If an antagonist blocks an autoreceptor, neurotransmitters are:
  - A) increased.
  - B) blocked.
  - C) metabolized.
  - D) reuptaked.

76. If an antagonist blocks an autoreceptor, neurotransmitters are:

- A) increased.
- B) blocked.
- C) metabolized.
- D) reuptaked.
- 77. During synaptic transmission, \_\_\_\_\_ would cause the ion channels to open, and \_\_\_\_\_ would cause the synaptic vesicles to fuse with the terminal membrane.
  - A) an action potential; neurotransmitters
  - B) enzymes; an action potential
  - C) an action potential; calcium
  - D) calcium; enzymes

78. When ion channels open along the presynaptic terminal, \_\_\_\_\_ tends to \_\_\_\_\_.

- A) neurotransmitters; enter the cell.
- B) neurotransmitters; exit the cell.
- C) calcium; enter the cell.
- D) calcium; exit the cell.

- 79. The two main categories of monoamines are:
  - A) acetylcholine and catecholamines.
  - B) enkephalins and endorphins.
  - C) indoleamines and catecholamines.
  - D) acetylcholine and indoleamines.
- 80. Catecholamines and indoleamines are subtypes of:
  - A) purines.
  - B) opioids.
  - C) monoamines.
  - D) indoleamines.
- 81. Serotonin, dopamine, and epinephrine are types of:
  - A) purines.
  - B) opioids.
  - C) monoamines.
  - D) indoleamines.
- 82. The enkephalins, endorphins, and dynorphins are subcategories of:
  - A) purines.
  - B) opioids.
  - C) monoamines.
  - D) indoleamines.
- 83. The endocannabinoids are known as:
  - A) purines.
  - B) opioids.
  - C) gases.
  - D) lipids.
- 84. All of the following are modulated by acetylcholine EXCEPT:
  - A) language.
  - B) emotional.
  - C) memory.
  - D) sensory.

- 85. Administration of the psychedelic drug scopolamine results in the:
  - A) blockade of postsynaptic ACh receptors.
  - B) increased degradation of ACh.
  - C) decreased synthesis of ACh.
  - D) increased levels of ACh.

86. Acetylcholine esterase (AChE) is known to \_\_\_\_\_\_ acetylcholine.

- A) metabolize
- B) enhance
- C) synthesize
- D) store
- 87. Acetylcholine esterase (AChE) is located in the:
  - A) presynaptic terminal.
  - B) postsynaptic terminal.
  - C) soma.
  - D) synaptic cleft.
- 88. Serotonin is a(n) \_\_\_\_\_, but it is also considered a(n) \_\_\_\_\_.
  - A) indoleamine; monoamine
  - B) quaternary amine; monoamine
  - C) amino acid; neuropeptide
  - D) indoleamine; amino acid
- 89. Inhibition of acetylcholine esterase (AChE) results in the:
  - A) blockade of postsynaptic ACh receptors.
  - B) increased degradation of ACh.
  - C) decreased synthesis of ACh.
  - D) increased levels of ACh.
- 90. Insecticides produce their effects by:
  - A) blocking postsynaptic ACh receptors.
  - B) increasing degradation of ACh.
  - C) decreasing synthesis of ACh.
  - D) increasing levels of ACh.

- 91. Nerve gas, such as Sarin, produces its effects by:
  - A) blocking postsynaptic ACh receptors.
  - B) increasing degradation of ACh.
  - C) decreasing synthesis of ACh.
  - D) increasing levels of ACh.
- 92. Reversible acetylcholine esterase (AChE) inhibitors are used clinically to treat:
  - A) Parkinson's disease.
  - B) multiple sclerosis.
  - C) muscular dystrophy.
  - D) Alzheimer's disease.
- 93. Muscarinic receptors are:
  - A) ionotropic.
  - B) metabotropic.
  - C) "fast."
  - D) presynaptic.
- 94. Nicotinic receptors are:
  - A) ionotropic.
  - B) metabotropic.
  - C) "fast."
  - D) presynaptic.
- 95. Nicotinic receptors are , and muscarinic receptors are .
  - A) metabotropic; ionotropic
  - B) ionotropic; metabotropic
  - C) "slow"; "fast"
  - D) presynaptic; postsynaptic
- 96. Nicotinic receptors are \_\_\_\_\_, and muscarinic receptors are \_\_\_\_\_.A) metabotropic; ionotropic

  - B) "fast"; "slow"
  - C) "slow"; "fast"
  - D) presynaptic; postsynaptic

- 97. Charlena has developed Alzheimer's disease. Current research suggests that she would benefit from drugs that activate the \_\_\_\_\_ muscarinic receptor.
  - A) M<sub>2</sub>
  - B) M<sub>3</sub>
  - C) M<sub>4</sub>
  - D) N<sub>1</sub>
- 98. An experimental lesion is performed in a mouse resulting in a dramatic change in the amount of REM sleep displayed by the animal. Based on what you know about neurotransmitters, the most reasonable conclusion is that the circuit involved must use:
  - A) dopamine.
  - B) acetylcholine.
  - C) glutamate.
  - D) GABA.
- 99. Monoamine oxidase (MAO) is a(n) \_\_\_\_\_, and acts by \_\_\_\_\_.
  - A) amino acid; degrading
  - B) gas; synthesizing
  - C) enzyme; degrading
  - D) drug; enhancing

100. The catecholamines include all of the following neurotransmitters EXCEPT:

- A) norepinephrine (NE).
- B) dopamine (DA).
- C) serotonin (5-HT).
- D) epinephrine (E).
- 101. The mechanism of action of the MAO inhibitor antidepressants is to:
  - A) blockade of receptors (antagonist action).
  - B) blockade of neurotransmitter reuptake (reuptake inhibitor).
  - C) blockade of enzymatic breakdown of neurotransmitter.
  - D) increase in release of neurotransmitter.
- 102. The D<sub>1</sub> receptor family includes the \_\_\_\_\_ receptor subtype.
  - A) D<sub>2A</sub>
  - B) D<sub>3</sub>
  - C) D4
  - D) D<sub>5</sub>

- 103. A new drug has been developed that improves psychotic symptoms in schizophrenics. Based on current knowledge in behavioral pharmacology, the \_\_\_\_\_ receptor is a possible site of action.
  - A) D<sub>1</sub>
  - B) D<sub>5</sub>
  - C) D<sub>2A</sub>
  - D) D<sub>6B</sub>
- 104. Tyrosine is a precursor to:
  - A) acetylcholine.
  - B) catecholamines.
  - C) indoleamines.
  - D) endocannabinoids.
- 105. Which of the following sequences is in the correct order for the biosynthesis pathway of the catecholamines?
  - A) Tyrosine, dopa, dopamine
  - B) Dopamine, epinephrine, norepinephrine
  - C) Norepinephrine, epinephrine, dopamine
  - D) Tyrosine, norepinephrine, dopamine
- 106. Which of the following sequences is in the correct order for the biosynthesis pathway of the catecholamines?
  - A) Dopa, tyrosine, dopamine
  - B) Dopamine, norepinephrine, epinephrine
  - C) Norepinephrine, epinephrine, dopamine
  - D) Tyrosine, norepinephrine, dopamine
- 107. The brain site responsible for producing the majority of the neurotransmitter norepinephrine (NE) in the brain is the:
  - A) raphe nuclei.
  - B) substantia nigra.
  - C) basal ganglia.
  - D) locus coeruleus.

- 108. Cell bodies of the neurotransmitter norepinephrine (NE) originate from the \_\_\_\_\_; its precursor, the chemical from which it is directly converted, is \_\_\_\_\_.
  - A) midbrain; 1-DOPA
  - B) midbrain; dopamine
  - C) locus coeruleus; l-DOPA
  - D) locus coeruleus; dopamine
- 109. Dopamine pathways originate in the:
  - A) cortex.
  - B) limbic system.
  - C) brain stem.
  - D) thalamus.
- 110. One dopamine pathway forms the "\_\_\_\_\_" circuit.
  - A) motor
  - B) memory
  - C) emotion
  - D) reward
- 111. Drugs that affect the neurotransmitter dopamine (DA) are used clinically to treat:
  - A) bipolar disorder.
  - B) schizophrenia.
  - C) panic disorder.
  - D) Alzheimer's disease.
- 112. Antipsychotic medications chiefly affect the neurotransmitter:
  - A) NE.
  - B) DA.
  - C) 5-HT.
  - D) E.
- 113. The neurotransmitters most clearly implicated in reward mechanisms and orienting responses, respectively, are:
  - A) 5-HT and DA.
  - B) DA and 5-HT.
  - C) DA and NE.
  - D) NE and DA.

- 114. Rex has developed an addiction to alcohol. One of the circuits in his brain that is likely to be affected is the pathway from the:
  - A) hypothalamus to the pituitary gland.
  - B) substantia nigra to the basal ganglia.
  - C) ventral tegmental area to the limbic system.
  - D) ventral tegmental area to the thalamus.
- 115. The brain site responsible for producing the majority of the neurotransmitter serotonin (5-HT) in the brain is the:
  - A) raphe nuclei.
  - B) substantia nigra.
  - C) basal ganglia.
  - D) locus coeruleus.
- 116. The neurotransmitter thought to be involved in a variety of processes including sleep, sex, affective disorders, and pain is:
  - A) ACh.
  - B) DA.
  - C) 5-HT.
  - D) NE.
- 117. Which of the following sequences is in the correct order for the biosynthesis pathway of the serotonin?
  - A) Tyrosine, tryptophan, 5-hydroxytryptophan
  - B) Tryptophan, tyrosine, 5-hydroxytryptamine
  - C) Tryptophan, 5-hydroxytryptophan, 5-hydroxytryptamine
  - D) 5-hydroxytryptamine, 5-hydroxytryptophan, tryptophan
- 118. The most common inhibitory and excitatory neurotransmitters in the brain are, respectively:
  - A) NE and 5-HT.
  - B) NE and GABA.
  - C) glutamate and GABA.
  - D) GABA and glutamate.

119. Glutamate is an \_\_\_\_\_ neurotransmitter, which is categorized as a \_\_\_\_\_.

- A) excitatory; amino acid
- B) excitatory; peptide
- C) inhibitory; amino acid
- D) inhibitory; peptide

- 120. Given their function, glutamate receptors are:
  - A) only metabotropic.
  - B) only ionotropic.
  - C) either metabotropic or ionotropic.
  - D) none of the above.
- 121. NMDA receptors:
  - A) require the presence of glycine to function properly.
  - B) involve magnesium ion activation.
  - C) require the influx of magnesium ions into the postsynaptic cell.
  - D) involve the influx of chloride into the cell.
- 122. The psychedelic drugs phencyclidine (PCP) and ketamine block receptors for the neurotransmitter:
  - A) DA.
  - B) NE.
  - C) 5-HT.
  - D) glutamate.
- 123. Blockade of the following receptor produces effects ranging from hallucinations to protection from excitotoxicity and head injury:
  - A) NMDA.
  - B) kainate.
  - C) AMPA.
  - D) quisqualate.

124. GABA is an \_\_\_\_\_ neurotransmitter, which is categorized as a \_\_\_\_\_.

- A) excitatory; amino acid
- B) excitatory; peptide
- C) inhibitory; amino acid
- D) inhibitory; peptide
- 125. GABA is found in high concentrations in the:
  - A) brain
  - B) spinal cord
  - C) brain and spinal cord
  - D) none of the above

- 126. \_\_\_\_ has been implicated in the pathogenesis, cognitive dysfunction, and negative symptoms of schizophrenia.
  - A) GABA
  - B) Glutamate
  - C) Glycine
  - D) Substance P
- 127. GABA receptors can be:
  - A) only metabotropic.
  - B) only ionotropic.
  - C) either metabotropic or ionotropic.
  - D) none of the above.
- 128. The benzodiazepine anxiolytics and barbiturate sedatives bind to the ligand-gated ion channel for the neurotransmitter:
  - A) glutamate.
  - B) GABA.
  - C) 5-HT.
  - D) NE.

- A) amino acid
- B) classical
- C) catecholamine
- D) peptide
- 130. The analgesic and reinforcing properties of morphine is thought to involve the \_\_\_\_\_\_ opioid receptor.
  - A) delta
  - B) omega
  - C) kappa
  - D) mu

131. Morphine, codeine, and heroin are thought to affect the neurotransmitter called:

- A) glutamate.
- B) GABA.
- C) opioids.
- D) dopamine.

- 132. Substance P is a type of:
  - A) peptide.
  - B) enzyme.
  - C) catecholamine.
  - D) gas.

133. Substance P plays a role in transmitting sensory information, which affects:

- A) taste.
- B) hearing.
- C) vision.
- D) pain.
- 134. Adenosine plays a role in:
  - A) learning.
  - B) addiction.
  - C) sleep.
  - D) emotion.

# Answer Key

- 1. A
- 2. B
- 3. D 4. D
- 4. D 5. C
- 6. B
- 7. B
- 8. B
- 9. B
- 10. D
- 11. C 12. D
- 13. B
- 14. C
- 15. D
- 16. D
- 17. A 18. C
- 10. C 19. A
- 20. D
- 21. A
- 22. B 23. D
- 24. B
- 25. C
- 26. B 27. A
- 28. D
- 29. D
- 30. A 31. A
- 31. A 32. A
- 33. D
- 34. C
- 35. D
- 36. B
- 37. D
- 38. A39. C
- 40. C
- 41. B
- 42. A
- 43. C
- 44. C

45.	D
46.	D
47.	С
48	A
49	Δ
	Δ
50.	Л
51.	D D
52. 52	D D
55. 51	D
54.	
55.	A
56.	A
57.	C
58.	D
59.	С
60.	С
61.	В
62.	А
63.	D
64.	С
65.	D
66.	D
67.	В
68.	А
69	C
70	B
70. 71	D
72	D
72.	B
73. 74	D
7 <del>4</del> . 75	
13.	A
/0.	A C
//.	C
/8.	C
<i>7</i> 9.	C
80.	С
81.	С
82.	В
83.	А
84.	С
85.	А
86.	А
87.	А
88.	А
89.	D
90.	А

91.	А
92.	D
93.	В
94.	А
95.	В
96.	В
97.	С
98.	В
99.	С
100.	С
101.	C
102.	D
103.	C
104.	D
105.	A
106.	В
10/.	D
108.	D
109.	C
110.	D
111.	D R
112.	D C
117.	C
117.	Δ
116	C
117.	A
118.	D
119.	Ā
120.	С
121.	А
122.	D
123.	А
124.	С
125.	С
126.	В
127.	С
128.	В
129.	D
130.	D
131.	C
132.	A
133.	D
134.	C

- 1. Describe the components of each of the following: hindbrain, midbrain, and forebrain.
- 2. What are the major components of the brain stem and each of their functions?
- 3. Why is the spinal cord so important?
- 4. Which regions of the brain process sensory information?
- 5. Trace the circuitry of the basal ganglia. What are its main functions?
- 6. Which regions of the brain process motor information?
- 7. What are the four main lobes of the cerebral cortex? What are each of their functions?
- 8. Describe the purpose of the Human Connectome Project. What are its methods, and what has been the outcome thus far?
- 9. Describe all the components of a typical neuron.
- 10. Explain the different types of glial cells within the central nervous system.
- 11. Starting with the action potential arriving at the axon terminal, describe the rest of the steps of exocytosis.
- 12. Explain the role of autoreceptors.
- 13. Describe the various types of monoamines.
- 14. What is acetylcholinesterase (AChE)? What effects do the drugs, AChE inhibitors, have in the brain, and why were they developed?

- 15. Describe the biosynthesis of the catecholamines and identify the enzymes involved in this reaction.
- 16. Describe the biosynthesis of the serotonin and identify the enzymes involved in this reaction.
- 17. Explain how NMDA receptors are activated.

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## **Answer Key**

- 1. Hindbrain: myelencephalon, metencephalon; midbrain: mesencephalon; forebrain: diencephalon, telencephalon.
- 2. Medulla, pons, midbrain.
- 3. Mediates communication between the brain and PNS; provides autonomic functions.
- 4. All four cortical lobes: cingulate cortex, tectum, thalamus, pons.
- 5. Caudate nucleus, putamen, globus pallidus, subthalamic nucleus, substantia nigra.
- 6. Frontal lobe, basal ganglia, cerebellum
- 7. Frontal, temporal, parietal, occipital lobes
- 8. Purpose: determining how neurons are connected across brain regions; methods: human anatomical studies, subject history, complex data analyses; outcome: development of new brain map resulting in first major revision of cortex since 1907.
- 9. Soma, organelles, dendrite, axon, terminals, synapse, vesicles, receptors, neurotransmitters, myelin sheath.
- 10. Oligodendrocytes, astrocytes, ependymal and microglial cells.
- 11. 1) calcium channels open, 2) calcium enters presynaptic terminal, 3) synaptic vesicles fuse with terminal membrane, open, and release neurotransmitters into synapse.
- 12. Monitor neurotransmitter concentrations.
- 13. NE, epi, DA, 5-HT.
- 14. AChE metabolizes ACh; ACHE inhibitors increase ACh concentrations; applications: Alzheimer's, agriculture, military.
- 15. Tyrosine  $\rightarrow$  dopa $\rightarrow$  dopamine  $\rightarrow$  norepinephrine  $\rightarrow$  epinephrine.
- 16. Tryptophan  $\rightarrow$  5-HTP  $\rightarrow$  5-HT.
- 17. 1) glutamate and another amino acid must bind to NMDA, 2) membrane depolarization pushes out Mg<sup>+</sup> from channel.