Name: _____ Date: _____

1. Which of the following activities is NOT a function of the spinal cord?
A) carrying sensory information from "body" (that is, skin, muscles, joints, and internals organs) to brain
B) carrying motor information from brain to "body"
C) modulating sensory information en route from "body" to brain
D) initiating motor commands to "body"

2. The brain stem includes all but the following:
A) pons.
B) medulla.
C) midbrain.
D) thalamus.

3. The brain stem is involved in all of the following functions, EXCEPT:
A) attention.
B) filtering.
C) arousal.
D) behavioral alerting (vigilance).

4. The diencephalon includes all but the following:
A) hypothalamus.
B) pituitary gland.
C) subthalamus.
D) cerebrum.

5. The correct sequence for hormone release is the following:
A) pituitary gland → hypothalamus → target organ.
B) hypothalamus → pituitary gland → target organ.
C) pituitary gland → target organ → hypothalamus.
D) hypothalamus → target organ → pituitary gland.

6. 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.

7. Which of the following is NOT a member of the limbic system?

A) hypothalamus
B) amygdala
C) hippocampus
D) dopamine-rich reward centers

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

A) nerve.
B) tract.
C) axon.
D) neuron.

9. In neurophysiology, the term *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.

10. 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.

11. The nucleus of a neural cell is found in the:

A) soma.
B) dendrite.
C) axon.
D) presynaptic terminal.

12. Administration of the psychedelic drug scopolamine results in:

A) blockade of postsynaptic ACh receptors.
B) increased degradation of ACh.
C) decreased synthesis of ACh.
D) increased levels of ACh.

13. Inhibition of acetylcholine esterase (AChE) results in:
A) blockade of postsynaptic ACh receptors.
B) increased degradation of ACh.
C) decreased synthesis of ACh.
D) increased levels of ACh.

14. Inhibition of acetylcholine esterase (AChE) results in:
A) blockade of postsynaptic ACh receptors.
B) increased degradation of ACh.
C) decreased degradation of ACh.
D) decreased synthesis of ACh.

15. 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.

16. Nerve gases such as *Sarin* produce their effects by:
A) blocking postsynaptic ACh receptors.
B) increasing degradation of ACh.
C) decreasing synthesis of ACh.
D) increasing levels of ACh.

17. Reversible acetylcholine esterase (AChE) inhibitors are used clinically to treat:
A) Parkinson's disease.
B) multiple sclerosis.
C) muscular dystrophy.
D) Alzheimer's disease.

18. Muscarinic receptors are:
A) ionotropic.
B) metabotropic.
C) “fast.”
D) presynaptic.

19. The *catecholamines* include all of the following neurotransmitters, EXCEPT:
A) norepinephrine (NE).
B) dopamine (DA).
C) serotonin (5-HT).
D) epinephrine (E).

20. The mechanism of action of the *MAO inhibitor* antidepressants is:
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.

21. 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.

22. In neurochemistry, the terms *alpha* and *beta* refer to subtypes of the neurotransmitter:
A) NE.
B) DA.
C) 5-HT.
D) E.

23. 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) D1
B) D5
C) D2A
D) D6B

24. Cell bodies of the neurotransmitter norepinephrine (NE) originate from the _____; its precursor (that is, the chemical from which it is directly converted) is _____.

A) midbrain; l-dopa
B) midbrain; dopamine
C) locus coeruleus; l-dopa
D) locus coeruleus; dopamine

25. Noradrenergic pathways:

A) originate in the forebrain.
B) project down the spinal cord to produce analgesic effects..
C) regulate hormone release from the pituitary.
D) project from the substantia nigra to the cerebellum.

26. The brain site responsible for producing the majority of the neurotransmitter norepinephrine (NE) in the brain is:

A) the raphe nuclei.
B) the substantia nigra.
C) the basal ganglia.
D) the locus coeruleus.

27. Antipsychotic medications chiefly affect the neurotransmitter:

A) NE.
B) DA.
C) 5-HT.
D) E.

28. Drugs that affect the neurotransmitter dopamine (DA) are used clinically to treat:

A) bipolar disorder.
B) schizophrenia.
C) panic disorder.
D) Alzheimer's disease.

29. Alterations in the function of the following neurotransmitter and/or its receptors typically affect central motor systems:

A) ACh.
B) DA.
C) 5-HT.
D) NE.

30. 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.

31. 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.

32. 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.

33. 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.

34. The psychedelic drugs phencyclidine (PCP) and ketamine block receptors for the neurotransmitter:

A) DA.
B) NE.
C) 5-HT.
D) glutamate.

35. 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.

36. 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.

37. The endogenous opoids including the enkephalins and endorphins are _____ neurotransmitters.

A) amino acid
B) classical
C) catecholamine
D) peptide

38. Once a neuron in the brain dies, it is not replaced.

A) True
B) False

39. New norepinephrine (NE) must be synthesized to replace each molecule that is released into the synapse.

A) True
B) False

40. Acetylcholine is a catecholamine neurotransmitter.

A) True
B) False

41. Acetylcholine is a peptide neurotransmitter.

A) True
B) False

42. Serotonin (5-HT) acts upon both “fast-responding” and “slow-responding” postsynaptic receptors.

A) True
B) False

43. The majority of the neurotransmitter acetylcholine (ACh) is taken back up into the presynaptic terminal.

A) True
B) False

44. The majority of the neurotransmitter acetylcholine (ACh) is metabolized in the synaptic cleft.

A) True
B) False

45. Acetylcholinesterase (AChE) inhibitors break down Ach in the synapse.

A) True
B) False

46. Acetylcholinesterase (AchE) is the major active ingredient in insecticides and *Sarin*.

A) True
B) False

47. Acetylcholine esterase (AchE) is used clinically as a cognitive enhancer in patients with Alzheimer's disease.

A) True
B) False

48. The majority of the neurotransmitter norepinephrine (NE) is metabolized in the synaptic cleft.

A) True
B) False

49. The neurotransmitter dopamine (DA) is may exert its effects through at least 6 receptor types.

A) True
B) False

50. The *amino acid* neurotransmitters (glutamate and GABA) are widely distributed in the brain.
A) True
B) False

51. GABA acts upon both "fast-responding" and "slow-responding" postsynaptic receptors.
A) True
B) False

52. Enkephalins are longer in terms of overall length of the peptide than endorphins.
A) True
B) False

53. The analgesic effect of serotonin and norepinephrine agonists are thought to occur due to a reduction in the release of substance P.
A) True
B) False

54. All of the following are considered primary divisions of the brain EXCEPT the:
A) hindbrain.
B) mesencephalon.
C) diencephalon.
D) forebrain.

55. The brainstem consists of the following nuclei EXCEPT the:
A) midbrain.
B) cerebellum.
C) pons.
D) medulla.

56. The "roof" of the midbrain is known as the:
A) cerebellum.
B) tegmentum.
C) substantia nigra.
D) tectum.

57. The _____ is part of the limbic system and contains dopamine.
A) tectum
B) tegmentum
C) substantia nigra
D) ventral tegmental area

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

59. The relay station between multiple subcortical areas and the cerebral cortex is known as the:
A) hypothalamus.
B) thalamus.
C) amygdala.
D) basal ganglia.

60. The hypothalamus controls the following functions EXCEPT:
A) eating.
B) drinking.
C) body temperature.
D) sensation.

61. The second major subdivision of the telencephalon is the:
A) limbic system.
B) pons.
C) cerebellum.
D) medulla.

62. 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.

63. Max has developed Parkinson's disease; he may benefit from the introduction of reprogrammed _____ into his basal ganglia.

A) organelles
B) lymphocytes
C) pericytes
D) vesicles

64. Vesicles fuse with the presynaptic membrane and the release of neurotransmitter into the synapse is called:

A) endocytosis.
B) exocytosis.
C) synaptic transmission.
D) transport.

65. Autoreceptors:

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.

66. 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

67. Charlena has developed Alzheimers disease; current research suggests that she would benefit from drugs that activate the _____ muscarinic receptor.

A) M_2
B) M_3
C) M_4
D) N_1

68. The D_1 receptor family includes the _____ receptor subtype.

A) D_{2A}
B) D_3
C) D_4
D) D_5

69. 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 niagara to the basal ganglia.
C) ventral tegmental area to the limbic system.
D) ventral tegmental area to the thalamus.

70. Serotonin:

A) is synthesized from tryptophan hydroxylase.
B) is abundant in the locus coeruleus.
C) plays an important role in feeding behavior.
D) is a target for antianxiety agents.

71. 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.

72. _____ has been implicated in the pathogenesis, cognitive dysfunction and negative symptoms of schizophrenia.

A) GABA
B) Glutamate
C) Glycine
D) Substance P

73. The analgesic and reinforcing properties of morphine is thought to involve the _____ opiod receptor.

A) delta
B) omega
C) kappa
D) mu

Answer Key

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

45. B
46. B
47. B
48. B
49. A
50. A
51. A
52. B
53. A
54. C
55. B
56. D
57. D
58. B
59. B
60. D
61. A
62. B
63. C
64. B
65. B
66. A
67. C
68. D
69. C
70. D
71. A
72. B
73. D