The Neurobiology of Learning and Memory 3rd edition Rudy Test Bank

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Chapter 2: Memory and the Brain: Central Concepts

Test Bank

Type: true-false
Title: Chapter 2 - Question 1
1. It is generally agreed that the brain works like a warehouse to store items of information.
a. True
*b. False

Type: true-false
Title: Chapter 2 - Question 2
2. Memory is a result of experience modifying synaptic connections between neurons that are activated by the experience.
*a. True
b. False

Type: true-false
Title: Chapter 2 - Question 3
3. The ionic composition of the intracellular and extracellular fluids become more alike when the neuron depolarizes.
*a. True
b. False

Type: true-false
Title: Chapter 2 - Question 4
4. An extracellular electrode used to measure the field potential detects a single depolarizing synapse.
a. True
*b. False

Type: true-false
Title: Chapter 2 - Question 5
5. When a neuron depolarizes, the composition of the inside of the cell becomes less like that of the extracellular fluid.
a. True
*b. False

Type: true-false
Title: Chapter 2 - Question 6
6. Glutamate is an excitatory neurotransmitter.
*a. True
b. False

Type: true-false
Title: Chapter 2 - Question 7
7. Glutamate receptors involved in LTP are found along the axon.
a. True
*b. False

Type: true-false
Title: Chapter 2 - Question 8
8. Calcium is a second messenger.
*a. True
b. False

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Type: true-false
Title: Chapter 2 - Question 9
9. Second messengers are proteins.
a. True
*b. False

Type: true-false
Title: Chapter 2 - Question 10
10. Second messengers can be quickly synthesized.
*a. True
b. False

Type: true-false
Title: Chapter 2 - Question 11
11. Phosphatases add phosphates to other proteins.
a. True
*b. False

Type: true-false
Title: Chapter 2 - Question 12
12. Ionotropic receptors protrude outside and inside the cell.
*a. True
b. False

Type: true-false
Title: Chapter 2 - Question 13
13. Competitive antagonists, such as APV, can replace a ligand and cause conformational changes in the receptor.
a. True
*b. False

Type: true-false
Title: Chapter 2 - Question 14
14. AMPA receptors influx mainly Na^+; NMDA receptors influx both Na^+ and Ca^{2+}.
*a. True
b. False

Type: true-false
Title: Chapter 2 - Question 15
15. Initial change in the strength of synapses depends on post-translational processes; however, enduring changes require new protein (transcription and translation processes).
*a. True
b. False

Type: essay/short answer question
Title: Chapter 2 - Question 16
16. Describe the in vitro LTP preparation.
Feedback: It requires dissecting a very thin tissue slice from the hippocampus and sustaining its function by placing the sample in a chemical cocktail. A stimulating electrode is positioned to stimulate axons, and a recording electrode is positioned to record the field potential.

Type: essay/short answer question
Title: Chapter 2 - Question 17
17. Why is the resting membrane potential negative?

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Feedback: There are more negatively charged ions inside the neuron.

Type: essay/short answer question
Title: Chapter 2 - Question 18
18. What is LTD?
Feedback: It is the reduction in the field potential produced by a weak, long-lasting inducing stimulus.

Type: essay/short answer question
Title: Chapter 2 - Question 19
19. Describe the simple form of an LTP experiment.
Feedback: The experiment has three stages: 1) A weak stimulus is applied to establish a baseline. 2) Then, a strong inducing stimulus is presented to induce LTP. 3) The weak stimulus is then presented again to determine if the synapses were strengthened.

Type: essay/short answer question
Title: Chapter 2 - Question 20
20. What are the three components of the synapse?
Feedback: 1) Presynaptic component; 2) postsynaptic component; 3) synaptic cleft

Type: essay/short answer question
Title: Chapter 2 - Question 21
21. Where are glutamate receptors found?
Feedback: Along the membrane of dendritic spines

Type: essay/short answer question
Title: Chapter 2 - Question 22
22. What is an excitatory synapse?
Feedback: A synapse with a postsynaptic component that has dendritic spines containing glutamate receptors.

Type: essay/short answer question
Title: Chapter 2 - Question 23
23. What is the composition of the postsynaptic density?
Feedback: It contains several hundred proteins that include glutamate receptors, ion channels, signaling enzymes, scaffolding proteins, and adhesion molecules.

Type: essay/short answer question
Title: Chapter 2 - Question 24
24. Where is the extracellular matrix located?
Feedback: The extracellular space separates the pre- and postsynaptic components of the synapse.

Type: essay/short answer question
Title: Chapter 2 - Question 25
25. What is glutamate?
Feedback: It is the excitatory neurotransmitter that binds to glutamate receptors.

Type: essay/short answer question
Title: Chapter 2 - Question 26
26. Where is the postsynaptic density located?
Feedback: In the area of the postsynaptic spine that receives neurotransmitter.

Type: essay/short answer question
Title: Chapter 2 - Question 27
27. Why is glutamate a first messenger?
Feedback: Because it binds to a cell surface receptor and initiates intracellular activity

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Type: essay/short answer question
Title: Chapter 2 - Question 28
28. What are the two types of proteins targeted by second messengers?
Feedback: Kinases and phosphatases

Type: essay/short answer question
Title: Chapter 2 - Question 29
29. What is the function of a kinase?
Feedback: To phosphorylate proteins and change their function

Type: essay/short answer question
Title: Chapter 2 - Question 30
30. What is the structure of a kinase?
Feedback: It has two domains: an inhibitory domain and a catalytic domain.

Type: essay/short answer question
Title: Chapter 2 - Question 31
31. What are the two functions of the postsynaptic density?
Feedback: 1) alignment of glutamate receptors located on the postsynaptic component with the presynaptic neurotransmitter release zone; 2) positioning of other signaling molecules needed to modify synapses near glutamate receptors so that they can be rapidly activated

Type: essay/short answer question
Title: Chapter 2 - Question 32
32. What is the cytosol?
Feedback: Fluid inside the cell

Type: essay/short answer question
Title: Chapter 2 - Question 33
33. What are the functions of phosphorylation?
Feedback: It changes a protein's 1) location, 2) ability to associate with other proteins, and 3) enzymatic activity.

Type: essay/short answer question
Title: Chapter 2 - Question 34
34. Memories evolve in four overlapping stages. What are they?
Feedback: 1) generation; 2) stabilization; 3) consolidation; 4) maintenance

Type: fill-in-blank
Title: Chapter 2 - Question 35
35. The performant path connects the entorhinal cortex to the _____.
*a. dentate gyrus

Type: fill-in-blank
Title: Chapter 2 - Question 36
36. Hebb referred to "diffuse circuits of connected neurons that develop to represent specific percepts or concepts" as _____.
*a. cell assemblies

Type: fill-in-blank
Title: Chapter 2 - Question 37
37. To induce LTP in CA3 neurons, the stimulating electrode should be placed near the _____.
*a. mossy fibers

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Type: fill-in-blank
Title: Chapter 2 - Question 38
38. Synaptic vesicles contain _____.
*a. neurotransmitter

Type: fill-in-blank
Title: Chapter 2 - Question 39
39. When the membrane potential becomes more negative, the neuron is said to be _____.
*a. hyperpolarized

Type: fill-in-blank
Title: Chapter 2 - Question 40
40. Axons projecting from the dentate gyrus to CA3 are called _____.
*a. mossy fibers

Type: fill-in-blank
Title: Chapter 2 - Question 41
41. Shaffer collaterals terminate onto _____.
*a. CA1 neurons

Type: fill-in-blank
Title: Chapter 2 - Question 42
42. The _____ in a typical LTP experiment is the fEPSP.
*a. dependent variable

Type: fill-in-blank
Title: Chapter 2 - Question 43
43. A major feature of the postsynaptic membrane in excitatory synapses is _____.
*a. PSD

Type: fill-in-blank
Title: Chapter 2 - Question 44
44. _____ are protein complexes that transport receptors to and from the plasma membrane.
*a. Endosomes

Type: fill-in-blank
Title: Chapter 2 - Question 45
45. The material that fills the synaptic cleft is called _____.
*a. extracellular matrix

Type: fill-in-blank
Title: Chapter 2 - Question 46
46. Excitatory synapses respond to the neurotransmitter called _____.
*a. glutamate

Type: fill-in-blank
Title: Chapter 2 - Question 47
47. The _____ domain of a kinase adds phosphate groups to other proteins.
*a. catalytic

Type: fill-in-blank
Title: Chapter 2 - Question 48
48. The process of _____ depends on the catalytic unit.
*a. phosphorylation

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Type: fill-in-blank
Title: Chapter 2 - Question 49
49. Kinases are put into the active state by _____.
*a. second messengers

Type: fill-in-blank
Title: Chapter 2 - Question 50
50. As the intensity of a high-frequency inducing stimulus increases, so does the _____ of LTP.
*a. duration

Type: fill-in-blank
Title: Chapter 2 - Question 51
51. The region of the spine where the membrane is thickened and contains scaffolding proteins and receptors is called the _____.
*a. PSD

Type: multiple response question
Title: Chapter 2 - Question 52
52. Which statement(s) is/are true? (Select all that apply.)
*a. Kinases modify other proteins via phosphorylation.
*b. Kinases are directly activated by first messengers.
*c. Phosphatases remove phosphates from proteins.
d. Phosphates phosphorylate second messengers.
e. None of the above

Type: multiple response question
Title: Chapter 2 - Question 53
53. Which does *not* describe a second messenger? (Select all that apply.)
*a. It is a type of protein with active and regulatory domains.
b. It relays signals from receptors to target molecules inside the cell.
c. It is readily made inside the cell.
d. It can activate kinases and phosphatases.

Type: multiple response question
Title: Chapter 2 - Question 54
54. Which statement(s) is/are true? (Select all that apply.)
a. The flow of information through the trisynaptic circuit begins at CA3.
b. The perforant path connects CA3 to CA1
c. Mossy fibers connect the dentate gyrus to CA1
*d. Shaffer collateral fibers connect CA3 connects to CA1
e. None of the above

Type: multiple response question
Title: Chapter 2 - Question 55
55. Where would you place the extracellular recording electrode to measure the field potential if you stimulated mossy fibers? (Select all that apply.)
a. In the dentate gyrus region
b. In the CA1 region
*c. In the CA3 region
d. In the entorhinal cortex
e. None of the above

Type: multiple response question
Title: Chapter 2 - Question 56
56. Which statement(s) about intracellular space is/are true? (Select all that apply.)

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*a. Depolarization makes the intracellular space more positive and drives the neuron towards generating action potentials.
b. Hyperpolarization makes the intracellular space more positive and drives the neuron toward generating action potentials.
c. When the neuron hyperpolarizes, the intracellular fluid becomes more similar to the extracellular fluid.
d. Depolarization makes the intracellular space more negative and drives the neuron toward generating action potentials.
e. None of the above.

Type: multiple response question
Title: Chapter 2 - Question 57
57. The field excitatory postsynaptic potential measures the _____. (Select all that apply.)
a. release of neurotransmitter from the postsynaptic neuron
b. flow of negatively charged ions out of the neuron
c. flow of positively charged ions into the neuron
d. flow of positively charged ions into the extracellular space
*e. None of the above

Type: multiple response question
Title: Chapter 2 - Question 58
58. The extracellular recording directly measures _____. (Select all that apply.)
a. the flow of positive ions into the neuron
b. the flow of negative ions out of the neuron
*c. positive ions leaving the field surrounding the electrode
d. positive ions leaving the neuron
e. None of the above

Type: multiple response question
Title: Chapter 2 - Question 60
60. Which statement(s) is/are true? (Select all that apply.)
a. The warehouse view memory is generally accepted.
*b. Hebb's cell assembly view of memory is generally accepted.
c. When one cell (A) participates in firing another cell (B), the ease with which A can fire B will decrease.
*d. Memories are stored in many brain regions.
e. None of the above

Type: multiple response question
Title: Chapter 2 - Question 61
61. When a neuron hyperpolarizes, the _____. (Select all that apply.)
*a. intracellular fluid becomes more negatively charged
b. likelihood of an action potential increases
*c. likelihood of an action potential decreases
d. membrane potential becomes more positive
e. neuron is damaged

Type: multiple response question
Title: Chapter 2 - Question 62
62. Which statement(s) is/are true? (Select all that apply.)
*a. Glutamate is a first messenger
b. The inhibitory unit of kinases phosphorylates proteins
*c. Second messengers change the state of kinases from inactive to active.
d. Second messengers are proteins
*e. Second messengers target phosphatases

Type: multiple response question

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Title: Chapter 2 - Question 63
63. Which statement(s) describe(s) a second messengers? (Select all that apply.)
a. They are proteins with active and inhibitory domains.
*b. They relay signals from receptors on the plasma membrane to target molecules inside the cell.
*c. They activate kinases and phosphatases.
d. They counteract the impact of first messengers.
*e. They amplify the impact of first messengers.

Type: multiple response question
Title: Chapter 2 - Question 64
64. Which statement(s) is/are correct? (Select all that apply.)
*a. Translation requires the presence of mRNA
*b. Post-translation processes modify existing protein
*c. The activation of a kinase would be an example of a post-translation modification.
d. Kinases activate second messengers
e. None of the above.

Type: multiple response question
Title: Chapter 2 - Question 65
65. Which statement(s) is/are true? (Select all that apply.)
a. The space between the presynaptic and postsynaptic neuron is empty.
b. The extracellular matrix resides in the postsynaptic neuron.
*c. Receptors and scaffolding proteins are located in the post synaptic density.
d. When the post-synaptic neuron depolarizes positive ions enter the cell.
*e. When the post-synaptic neuron depolarizes negative ions enter the cell.

Type: multiple response question
Title: Chapter 2 - Question 66
66. Which statement(s) about an LTP experiment is/are *false*? (Select all that apply.)
*a. The independent variable is the intensity of the electrode.
b. The dependent variable is the fEPSP.
*c. The inducing stimulus is used to establish a baseline.
d. The test stimulus is set to about 35–50% of maximal response.
e. None of the above

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