

# Neuroscience

## Exam #4

# Electrophysiology

Author: David Corey

Instructor @MIT

Published 2014

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## 1. Electrophysiology

## 4. Chapter: Electrophysiology

### 1. Electrophysiology Questions

#### 4.1.1. (7 pt) Long-term potentiation at the CA3-to-CA1 synapse in the hipp...

Author: David Corey

(7 pt) Long-term potentiation at the CA3-to-CA1 synapse in the hippocampus has these characteristics (circle all that apply):

Please choose all the answers that apply:

- requires extracellular Ca<sup>2+</sup>
- requires postsynaptic depolarization
- involves activation of protein kinase A
- involves insertion of new AMPA receptors in the presynaptic membrane
- is blocked by botulinum toxin in the postsynaptic cytoplasm
- shares essentially the same mechanism at all synapses that use glutamate receptors
- is mediated by binding of anandamide at CB1 receptors

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#### 4.1.2. \_\_\_ nicotine

Author: David Corey

A great many psychoactive drugs affect proteins associated with synaptic transmission.

Match the drug or class of drugs with its target(s).

\_\_\_ nicotine

Please choose only one answer:

- dopamine D2 receptors
- Na<sup>+</sup>/dopamine cotransporters
- 5HT transporters
- serotonin receptors
- GABAA receptors
- adenosine receptors
- vesicular H<sup>+</sup>/dopamine antiporters
- monoamine oxidase
- μ-opiate receptors
- nACh receptors
- CB1 receptors
- NMDA receptors

Check the answer of this question online at QuizOver.com:

Question: [nicotine A great many psychoactive drugs affect proteins by Dr. David](#)

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### 4.1.3. \_\_\_morphine

Author: David Corey

A great many psychoactive drugs affect proteins associated with synaptic transmission.

Match the drug or class of drugs with its target(s).

\_\_\_morphine

Please choose only one answer:

- dopamine D2 receptors
- Na<sup>+</sup>/dopamine cotransporters
- 5HT transporters
- serotonin receptors
- GABAA receptors
- adenosine receptors
- vesicular H<sup>+</sup>/dopamine antiporters
- monoamine oxidase
- μ-opiate receptors
- nACh receptors
- CB1 receptors
- NMDA receptors

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#### 4.1.4. \_\_\_ caffeine

Author: David Corey

A great many psychoactive drugs affect proteins associated with synaptic transmission.

Match the drug or class of drugs with its target(s).

\_\_\_ caffeine

Please choose only one answer:

- dopamine D2 receptors
- Na<sup>+</sup>/dopamine cotransporters
- 5HT transporters
- serotonin receptors
- GABAA receptors
- adenosine receptors
- vesicular H<sup>+</sup>/dopamine antiporters
- monoamine oxidase
- μ-opiate receptors
- nACh receptors
- CB1 receptors
- NMDA receptors

Check the answer of this question online at QuizOver.com:

Question: [caffeine A great many psychoactive drugs affect proteins by Dr. David](#)

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#### 4.1.5. \_\_\_ LSD

Author: David Corey

A great many psychoactive drugs affect proteins associated with synaptic transmission.

Match the drug or class of drugs with its target(s).

\_\_\_ LSD

Please choose only one answer:

- dopamine D2 receptors
- Na<sup>+</sup>/dopamine cotransporters
- 5HT transporters
- serotonin receptors
- GABAA receptors
- adenosine receptors
- vesicular H<sup>+</sup>/dopamine antiporters
- monoamine oxidase
- μ-opiate receptors
- nACh receptors
- CB1 receptors
- NMDA receptors

Check the answer of this question online at QuizOver.com:

Question: [LSD A great many psychoactive drugs affect proteins by Dr. David](#)

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#### 4.1.6. \_\_\_ tetrahydrocannabinol

Author: David Corey

A great many psychoactive drugs affect proteins associated with synaptic transmission.

Match the drug or class of drugs with its target(s).

\_\_\_ tetrahydrocannabinol

Please choose only one answer:

- dopamine D2 receptors
- Na<sup>+</sup>/dopamine cotransporters
- 5HT transporters
- serotonin receptors
- GABAA receptors
- adenosine receptors
- vesicular H<sup>+</sup>/dopamine antiporters
- monoamine oxidase
- μ-opiate receptors
- nACh receptors
- CB1 receptors
- NMDA receptors

Check the answer of this question online at QuizOver.com:

Question: [tetrahydrocannabinol A great many psychoactive drugs affect proteins](http://www.quizover.com/question/tetrahydrocannabinol-a-great-many-psychoactive-drugs-affect-proteins?pdf=3044)

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Interactive Question:

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#### 4.1.7. \_\_\_ cocaine

Author: David Corey

A great many psychoactive drugs affect proteins associated with synaptic transmission.

Match the drug or class of drugs with its target(s).

\_\_\_ cocaine

Please choose only one answer:

- dopamine D2 receptors
- Na<sup>+</sup>/dopamine cotransporters
- 5HT transporters
- serotonin receptors
- GABAA receptors
- adenosine receptors
- vesicular H<sup>+</sup>/dopamine antiporters
- monoamine oxidase
- μ-opiate receptors
- nACh receptors
- CB1 receptors
- NMDA receptors

Check the answer of this question online at QuizOver.com:

Question: [cocaine A great many psychoactive drugs affect proteins by Dr. David](#)

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#### 4.1.8. \_\_\_ reserpine

Author: David Corey

A great many psychoactive drugs affect proteins associated with synaptic transmission.

Match the drug or class of drugs with its target(s).

\_\_\_ reserpine

Please choose only one answer:

- dopamine D2 receptors
- Na<sup>+</sup>/dopamine cotransporters
- 5HT transporters
- serotonin receptors
- GABAA receptors
- adenosine receptors
- vesicular H<sup>+</sup>/dopamine antiporters
- monoamine oxidase
- μ-opiate receptors
- nACh receptors
- CB1 receptors
- NMDA receptors

Check the answer of this question online at QuizOver.com:

Question: [reserpine A great many psychoactive drugs affect proteins by Dr.](http://www.quizover.com/question/reserpine-a-great-many-psychoactive-drugs-affect-proteins-by-dr?pdf=3044)

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#### 4.1.9. \_\_\_ amphetamines

Author: David Corey

A great many psychoactive drugs affect proteins associated with synaptic transmission.

Match the drug or class of drugs with its target(s).

\_\_\_ amphetamines

Please choose all the answers that apply:

- dopamine D2 receptors
- Na<sup>+</sup>/dopamine cotransporters
- 5HT transporters
- serotonin receptors
- GABAA receptors
- adenosine receptors
- vesicular H<sup>+</sup>/dopamine antiporters
- monoamine oxidase
- μ-opiate receptors
- nACh receptors
- CB1 receptors
- NMDA receptors

Check the answer of this question online at QuizOver.com:

Question: [amphetamines A great many psychoactive drugs affect proteins by Dr](#)

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#### 4.1.10. \_\_\_chlorpromazine

Author: David Corey

A great many psychoactive drugs affect proteins associated with synaptic transmission.

Match the drug or class of drugs with its target(s).

\_\_\_chlorpromazine

Please choose only one answer:

- dopamine D2 receptors
- Na<sup>+</sup>/dopamine cotransporters
- 5HT transporters
- serotonin receptors
- GABAA receptors
- adenosine receptors
- vesicular H<sup>+</sup>/dopamine antiporters
- monoamine oxidase
- μ-opiate receptors
- nACh receptors
- CB1 receptors
- NMDA receptors

Check the answer of this question online at QuizOver.com:

Question: [chlorpromazine A great many psychoactive drugs affect proteins by](#)

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#### 4.1.11. \_\_\_barbiturates

Author: David Corey

A great many psychoactive drugs affect proteins associated with synaptic transmission.

Match the drug or class of drugs with its target(s).

\_\_\_barbiturates

Please choose only one answer:

- dopamine D2 receptors
- Na<sup>+</sup>/dopamine cotransporters
- 5HT transporters
- serotonin receptors
- GABAA receptors
- adenosine receptors
- vesicular H<sup>+</sup>/dopamine antiporters
- monoamine oxidase
- μ-opiate receptors
- nACh receptors
- CB1 receptors
- NMDA receptors

Check the answer of this question online at QuizOver.com:

Question: [barbiturates A great many psychoactive drugs affect proteins by Dr](#)

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#### 4.1.12. \_\_\_benzodiazepines

Author: David Corey

A great many psychoactive drugs affect proteins associated with synaptic transmission.

Match the drug or class of drugs with its target(s).

\_\_\_benzodiazepines

Please choose only one answer:

- dopamine D2 receptors
- Na<sup>+</sup>/dopamine cotransporters
- 5HT transporters
- serotonin receptors
- GABAA receptors
- adenosine receptors
- vesicular H<sup>+</sup>/dopamine antiporters
- monoamine oxidase
- μ-opiate receptors
- nACh receptors
- CB1 receptors
- NMDA receptors

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#### 4.1.13. \_\_\_imipramine

Author: David Corey

A great many psychoactive drugs affect proteins associated with synaptic transmission.

Match the drug or class of drugs with its target(s).

For each of the following choose the correct receptor(s). Your choices are

\_\_\_imipramine

Please choose only one answer:

- dopamine D2 receptors
- Na<sup>+</sup>/dopamine cotransporters
- 5HT transporters
- serotonin receptors
- GABAA receptors
- adenosine receptors
- vesicular H<sup>+</sup>/dopamine antiporters
- monoamine oxidase
- μ-opiate receptors
- nACh receptors
- CB1 receptors
- NMDA receptors

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4.1.14. mediates the fastest excitatory transmission \_\_\_\_\_

Author: David Corey

mediates the fastest excitatory transmission \_\_\_\_\_

Please choose only one answer:

- AMPA receptor
- NMDA receptor
- metabotropic glutamate receptor

Check the answer of this question online at QuizOver.com:

Question: [mediates the fastest excitatory transmission by Dr. David Corey](#)

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4.1.15. has seven transmembrane domains \_\_\_\_\_

Author: David Corey

has seven transmembrane domains \_\_\_\_\_

Please choose only one answer:

- AMPA receptor
- NMDA receptor
- metabotropic glutamate receptor

Check the answer of this question online at QuizOver.com:

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4.1.16. is blocked by extracellular Mg<sup>2+</sup> \_\_\_\_\_

Author: David Corey

is blocked by extracellular Mg<sup>2+</sup> \_\_\_\_\_

Please choose only one answer:

- AMPA receptor
- NMDA receptor
- metabotropic glutamate receptor

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4.1.17. is activated by glutamate \_\_\_\_\_

Author: David Corey

is activated by glutamate \_\_\_\_\_

Please choose all the answers that apply:

- AMPA receptor
- NMDA receptor
- metabotropic glutamate receptor

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#### 4.1.18. associates with G-proteins \_\_\_\_\_

Author: David Corey

associates with G-proteins \_\_\_\_\_

Please choose only one answer:

- AMPA receptor
- NMDA receptor
- metabotropic glutamate receptor

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#### 4.1.19. variability in function caused by RNA editing \_\_\_\_\_

Author: David Corey

variability in function caused by RNA editing \_\_\_\_\_

Please choose only one answer:

- AMPA receptor
- NMDA receptor
- metabotropic glutamate receptor

Check the answer of this question online at QuizOver.com:

Question: [variability in function caused by RNA editing Dr. David Corey @MIT](#)

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#### 4.1.20. (4 pt) Sketch the action potential after the manipulations describe...

Author: David Corey

(4 pt) Sketch the action potential after the manipulations described below.

A control trace is already sketched in each panel.

The ionic conditions are given below

$[K^+]_{in} = 140 \text{ mM}$   $[K^+]_{out} = 4 \text{ mM}$

$[Na^+]_{in} = 10 \text{ mM}$   $[Na^+]_{out} = 140 \text{ mM}$

- The sodium channels have a mutation which slows inactivation.
- Enough TTX is added to block about half of the sodium channels.
- The extracellular potassium concentration is increased to 6 mM.
- The extracellular sodium concentration is increased to 150 mM.

Check the answer of this question online at QuizOver.com:

Question: [4 pt Sketch the action potential after the by Dr. David Corey @MIT](#)

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#### 4.1.21. Which of these are true of vesicle release?

Author: David Corey

Which of these are true of vesicle release?

Please choose all the answers that apply:

- Cholera toxin and pertussis toxin inhibit neurotransmission by cleaving proteins of the SNARE complex.
- Synaptobrevin is the Ca<sup>2+</sup> sensor triggered by Ca<sup>2+</sup> influx through voltage-gated calcium channels.
- At a typical presynaptic terminal in the CNS, the readily releasable pool of vesicles numbers only 100-200.
- Ca<sup>2+</sup> accumulation during multiple presynaptic action potentials causes facilitation of transmitter release.
- Presynaptic G-protein coupled receptors can inhibit transmitter release both by inhibiting voltage-gated Ca<sup>2+</sup> channels and by activating potassium channels.

Check the answer of this question online at QuizOver.com:

Question: [Which of these are true of vesicle release by Dr. David Corey @MIT](#)

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