

What is Synaptic Transmission?

Worksheet

Synaptic transmission occurs when an action potential triggers release of neurotransmitter from the presynaptic neuron, which diffuses across the synaptic cleft and binds receptors on the postsynaptic cell, generating a new signal.

Questions

1. What directly triggers neurotransmitter release from the presynaptic terminal?
 - A) Sodium influx
 - B) Calcium influx
 - C) Potassium efflux
 - D) Chloride influx
2. Where do neurotransmitters travel after release?
 - A) Back into the same vesicle
 - B) Across the synaptic cleft to receptors
 - C) Into the nucleus
 - D) Directly into the bloodstream
3. What process releases neurotransmitter from vesicles into the synaptic cleft?
 - A) Endocytosis
 - B) Osmosis
 - C) Exocytosis
 - D) Phagocytosis
4. Which of these ends a synaptic signal?
 - A) More calcium entering
 - B) Reuptake or enzymatic breakdown of neurotransmitter
 - C) Opening more vesicles
 - D) Increasing action potential frequency
5. A synapse has a typical synaptic delay of about 0.5 milliseconds. If a signal crosses 4 synapses in a row, what is the total delay?
6. One action potential can trigger the release of about 200 synaptic vesicles, and each vesicle contains roughly 5,000 neurotransmitter molecules. How many molecules are released in total?
7. Acetylcholine is broken down by acetylcholinesterase within about 1 millisecond of release. If a neuron fires 100 times per second, is there enough time between signals to clear the neurotransmitter?
8. Define: What is synaptic transmission?
9. Define: What triggers neurotransmitter release?
10. Define: What is the synaptic cleft?

Answer Key

1. B) Calcium influx - Calcium ions entering through voltage-gated channels trigger vesicle fusion and neurotransmitter release.
2. B) Across the synaptic cleft to receptors - Neurotransmitters diffuse across the synaptic cleft and bind receptors on the postsynaptic membrane.
3. C) Exocytosis - Exocytosis is the fusion of vesicles with the cell membrane, releasing their contents outside the cell.
4. B) Reuptake or enzymatic breakdown of neurotransmitter - Reuptake and enzymatic breakdown clear neurotransmitter from the cleft, stopping receptor activation.
5. Delay per synapse = 0.5 ms Number of synapses = 4 Total delay = $0.5 \times 4 = 2$ milliseconds
6. Total molecules = vesicles molecules per vesicle Total = $200 \times 5,000 = 1,000,000$ molecules About one million neurotransmitter molecules flood the synaptic cleft.
7. Time between firings = 1 second / 100 = 10 milliseconds Breakdown time 1 millisecond Since 1 ms < 10 ms, there is enough time to clear the synapse before the next signal arrives.
8. The process of signal transfer from one neuron to another (or to a muscle/gland) across a synapse, usually using chemical neurotransmitters.
9. An arriving action potential opens voltage-gated calcium channels, and the calcium influx causes vesicles to fuse and release neurotransmitter.
10. The narrow gap between the presynaptic and postsynaptic membranes that neurotransmitter molecules diffuse across.

Bounlu

All cards, step-by-step solutions and an AI tutor are in the Notek app.
Promy turns exam dates into automatic reminders.