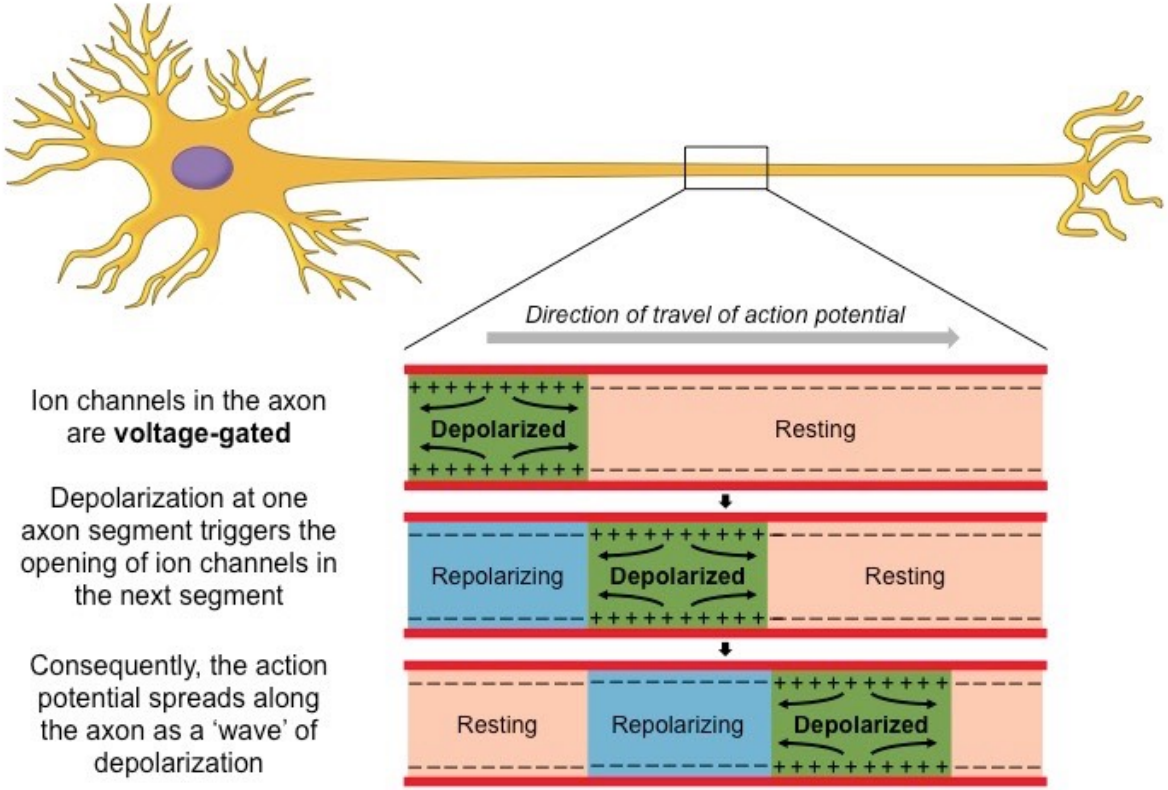
Johns Hopkins Engineering

Methods in Neurobiology

Principle of Synaptic Transmission

2-Minute Neuroscience: Action Potential

Propagation of action potential



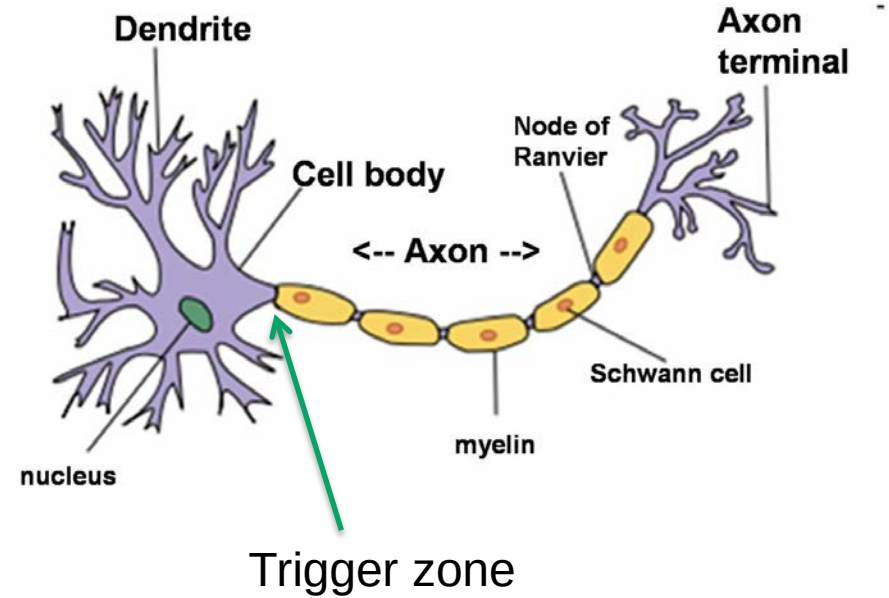
Ion channels in the axon are **voltage-gated**

Depolarization at one axon segment triggers the opening of ion channels in the next segment

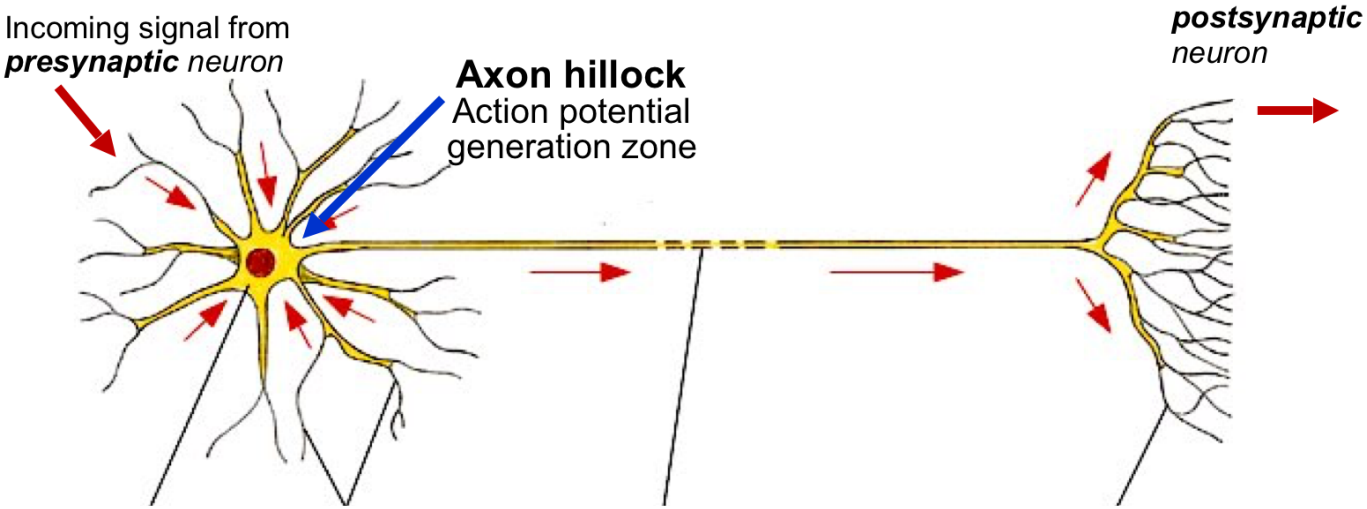
Consequently, the action potential spreads along the axon as a 'wave' of depolarization

Factors influencing conduction of AP

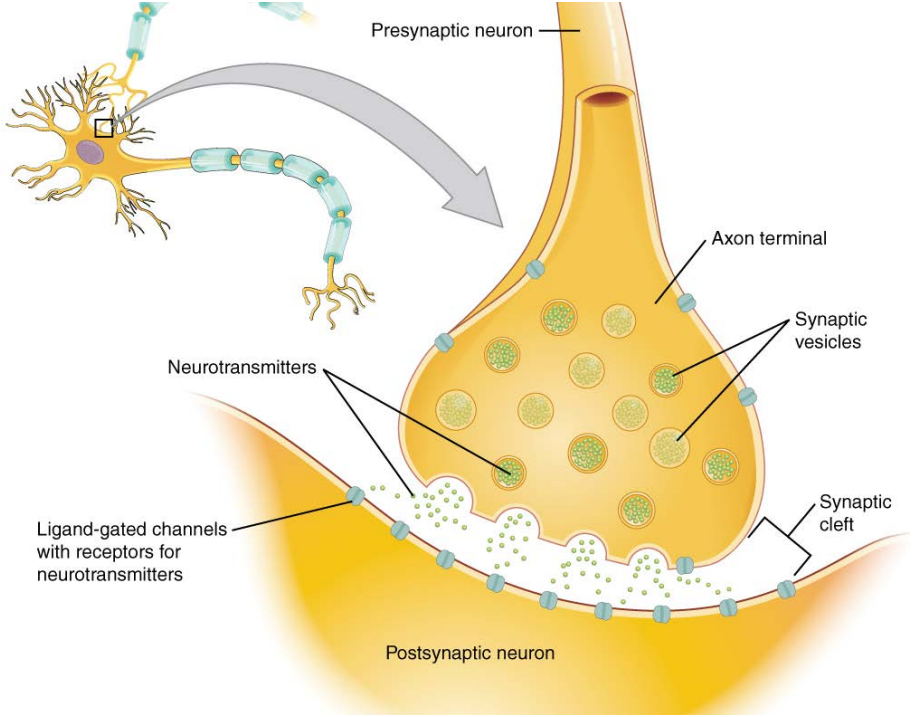
- Presence, type and concentration of voltage-gated channels
- Membrane resistance
- Membrane capacitance
- Axon diameter
- Myelin



Communication within a neuron



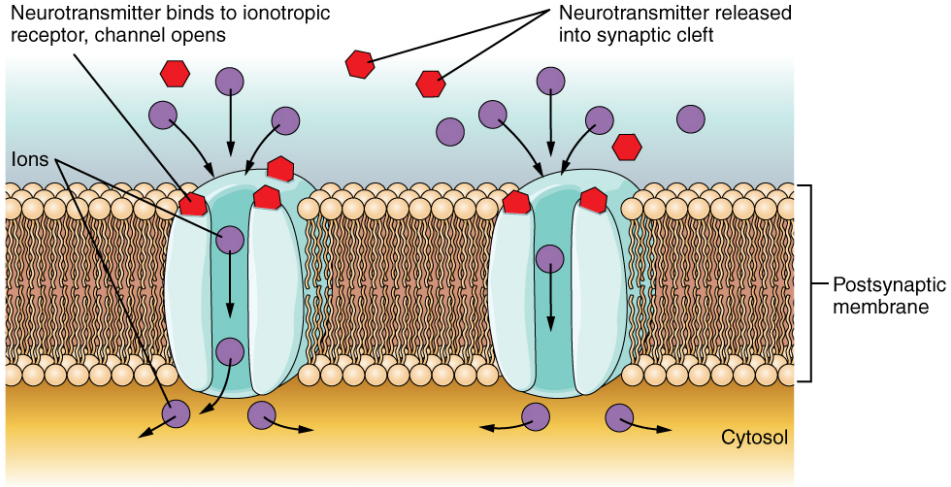
Communication between neurons: synaptic transmission



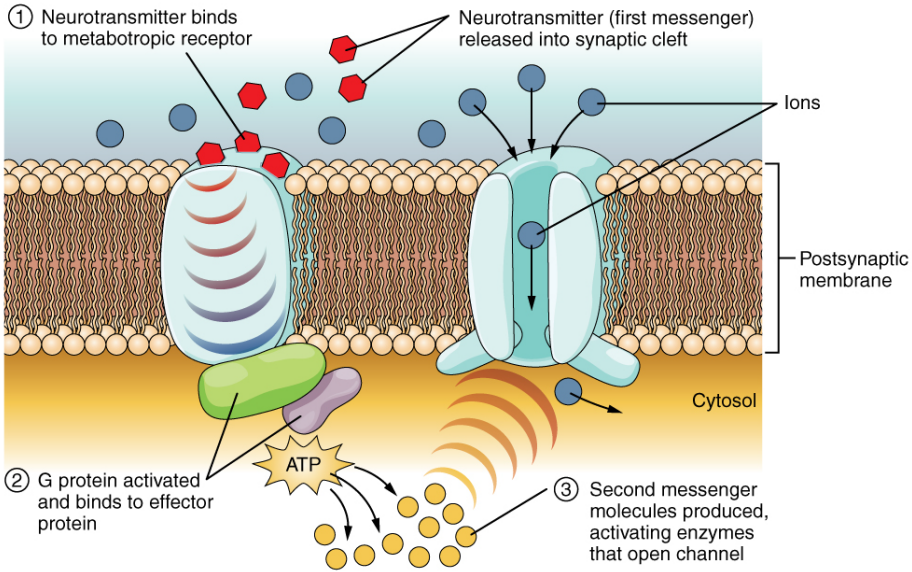
Classes of neurotransmitters:

- Amines (dopamine, serotonine, acetylcholine)
- Aminoacids (glutammate, glycine)
- Neuropeptides (neuropeptide Y, insulin)

Synaptic modulation

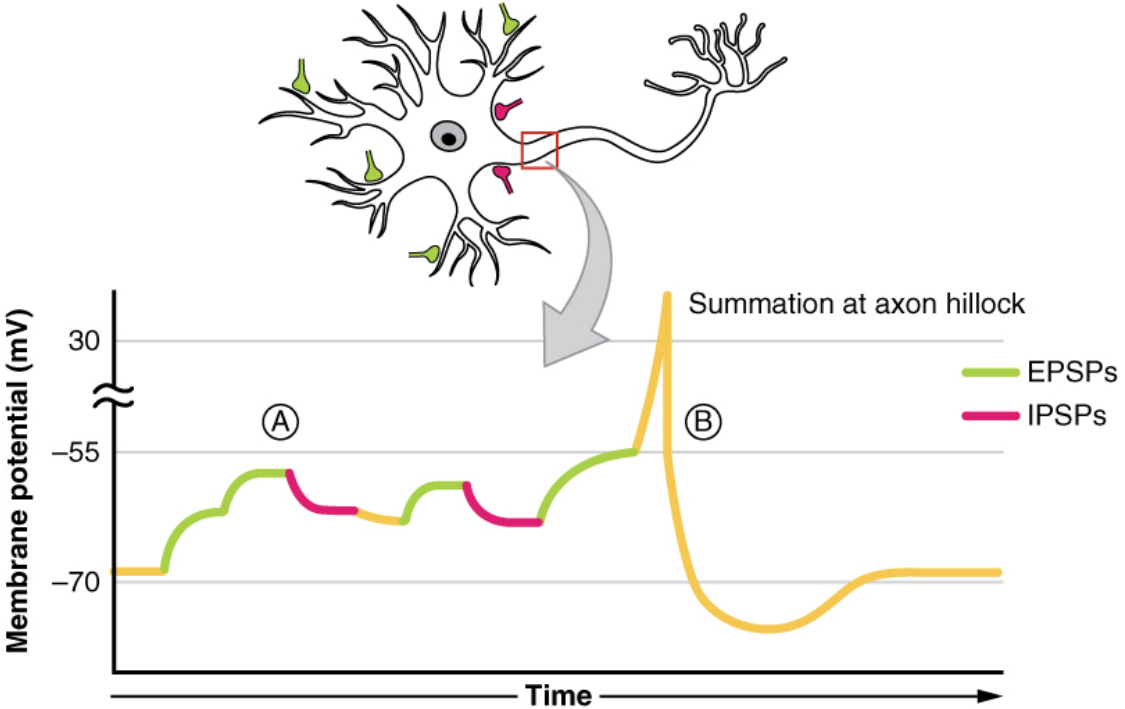


(a) Direct activation brings about immediate response



(b) Indirect activation involves a prolonged response, amplified over time

Signal integration



Temporal vs Spatial summation

References

Slide	Reference
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5	Alina6 n.d. Lecture 14- Action potential. https://www.memorangapp.com/flashcards/172336/Lecture+14-+Action+potential/
6-8	Communication between neurons (n.d.) Anatomy and Physiology. Rice University https://opentextbc.ca/anatomyandphysiology/chapter/12-5-communication-between-neurons/