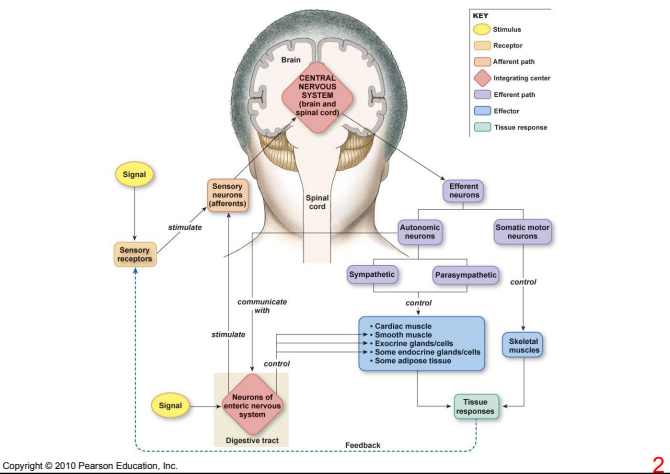


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1

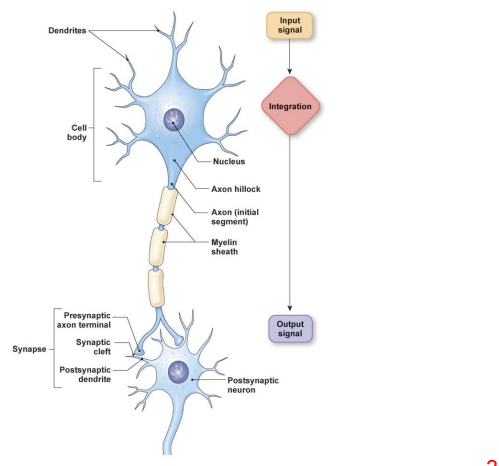
Figure 8-1



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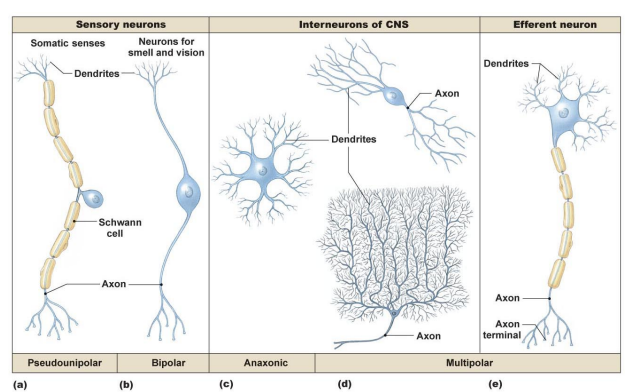
Figure 8-2



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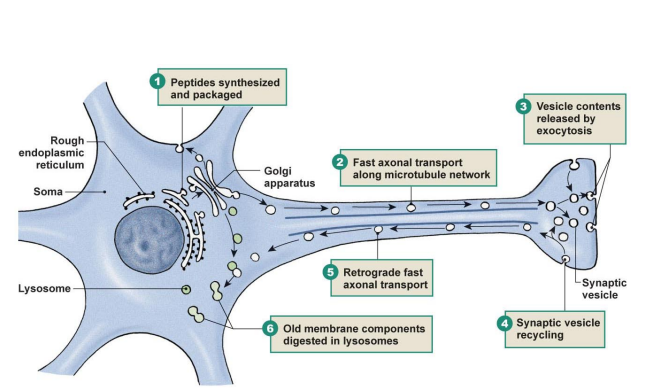
Figure 8-3



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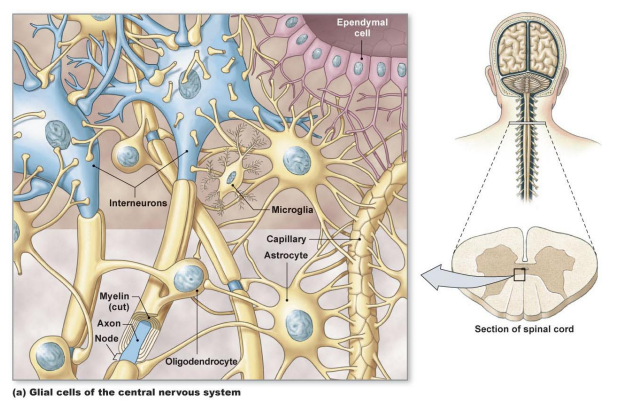
Figure 8-4



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5

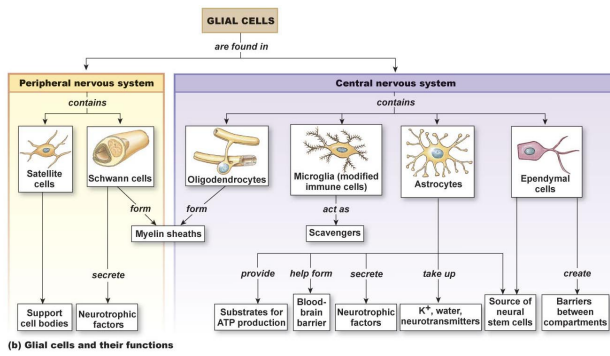
Figure 8-5a, overview



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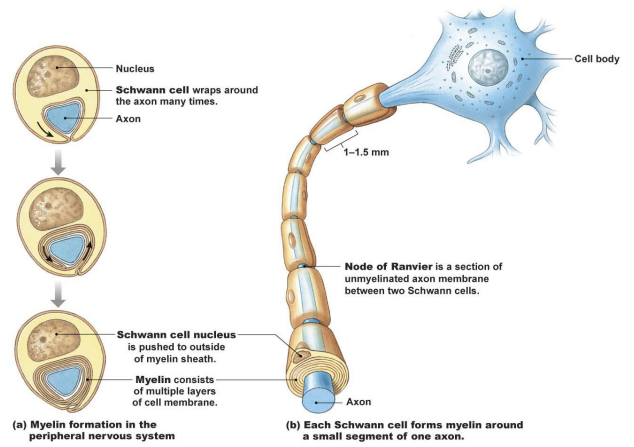
6

Figure 8-5b, overview



(b) Glial cells and their functions

Figure 8-6



(a) Myelin formation in the peripheral nervous system

(b) Each Schwann cell forms myelin around a small segment of one axon.

Table 8-2

| ION | EXTRACELLULAR FLUID (mM) | INTRACELLULAR FLUID (mM) | E_{ion} AT 37° C |
|-----------|--------------------------------|--------------------------|------------------------------|
| K^+ | 5 mM (normal range: 3.5–5) | 150 mM | -90 mV |
| Na^+ | 145 mM (normal range: 135–145) | 15 mM | +60 mV |
| Cl^- | 108 mM (normal range: 100–108) | 10 mM (range: 5–15) | -63 mV |
| Ca^{2+} | 1 mM | 0.0001 mM | see Concept Check question 6 |

Table 8-3

| | GRADED POTENTIAL | ACTION POTENTIAL |
|--------------------------------------|--|--|
| Type of signal | Input signal | Regenerating conduction signal |
| Occurs where? | Usually dendrites and cell body | Trigger zone through axon |
| Types of gated ion channels involved | Mechanically, chemically, or voltage-gated channels | Voltage-gated channels |
| Ions involved | Usually Na^+ , Cl^- , Ca^{2+} | Na^+ and K^+ |
| Type of signal | Depolarizing (e.g., Na^+) or hyperpolarizing (e.g., Cl^-) | Depolarizing |
| Strength of signal | Depends on initial stimulus; can be summed | All-or-none phenomenon; cannot be summed |
| What initiates the signal? | Entry of ions through channels | Above-threshold graded potential at the trigger zone |
| Unique characteristics | No minimum level required to initiate | Threshold stimulus required to initiate |
| | Two signals coming close together in time will sum | Refractory period: two signals too close together in time cannot sum |
| | Initial stimulus strength is indicated by frequency of a series of action potentials | |

Figure 5-33

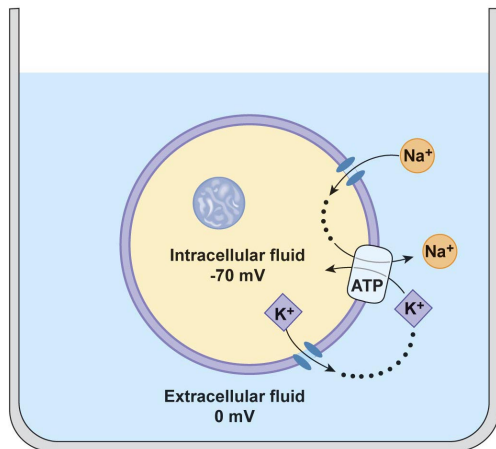


Figure 5-34

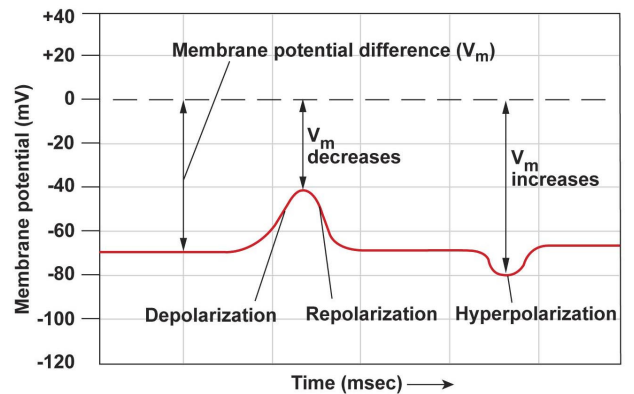


Figure 8-7

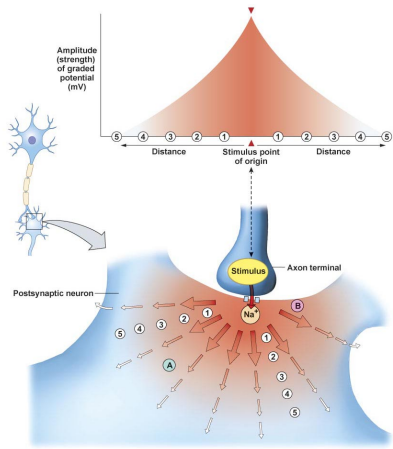


Figure 8-8

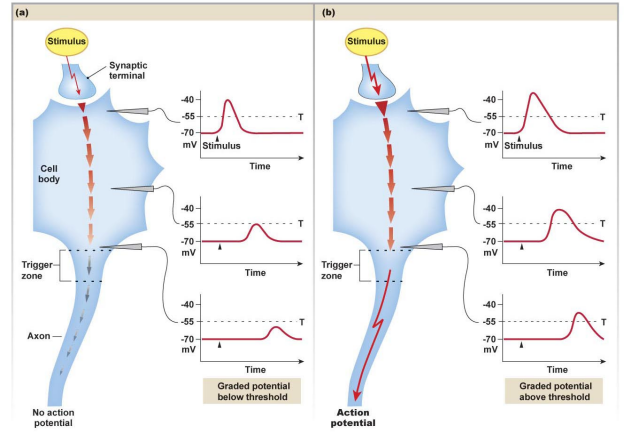


Figure 8-9, overview

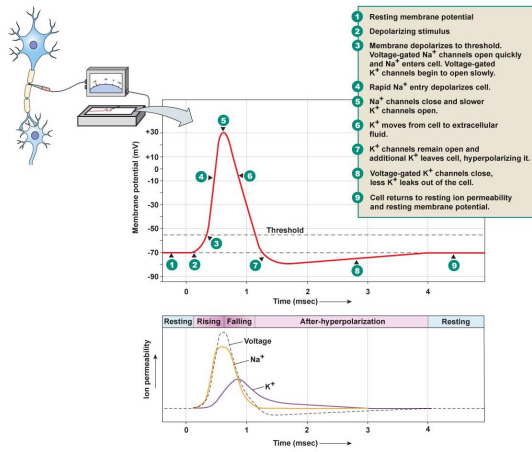


Figure 8-10

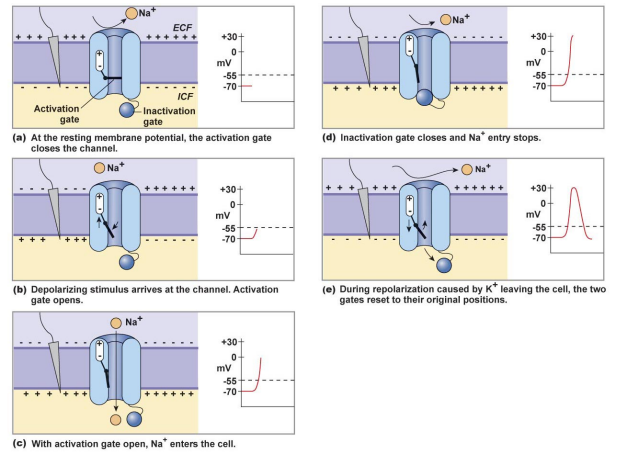


Figure 8-11

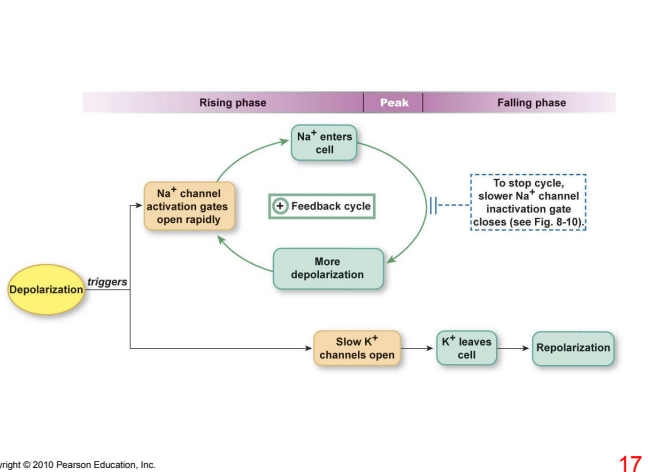


Figure 8-12

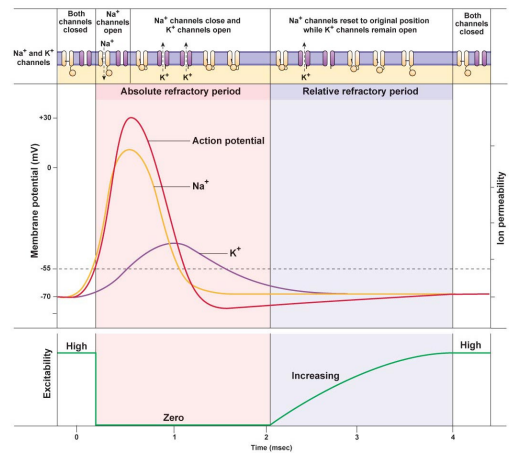


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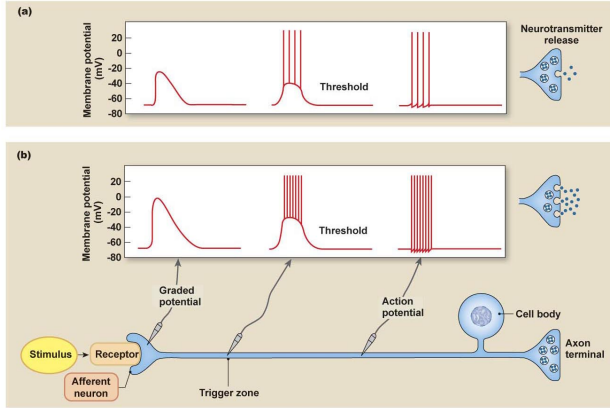


Figure 8-14

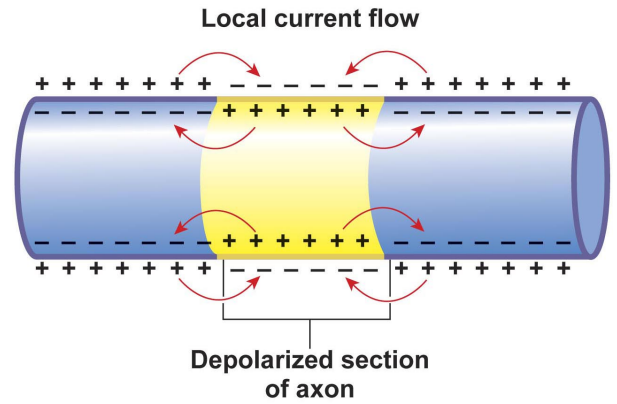


Figure 8-15, overview

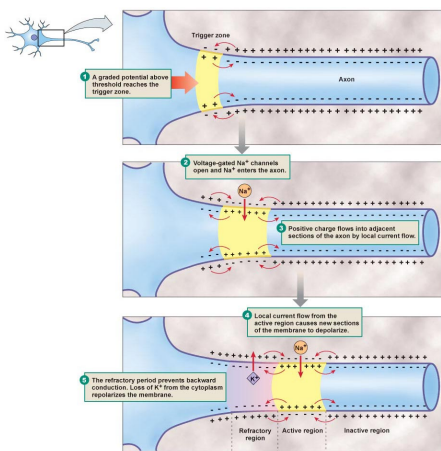


Figure 8-16a-b

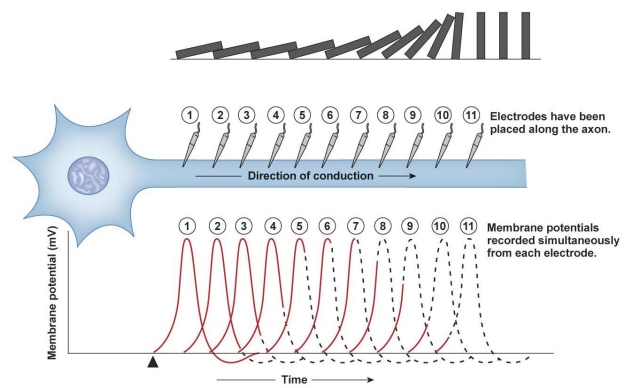


Figure 8-17

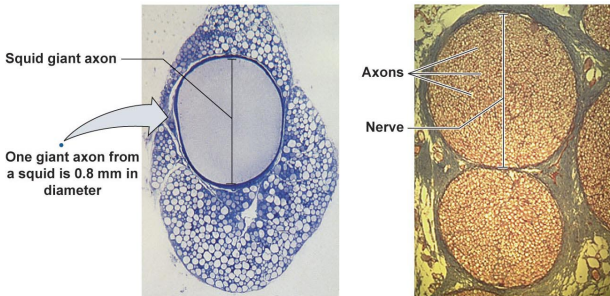


Figure 8-18

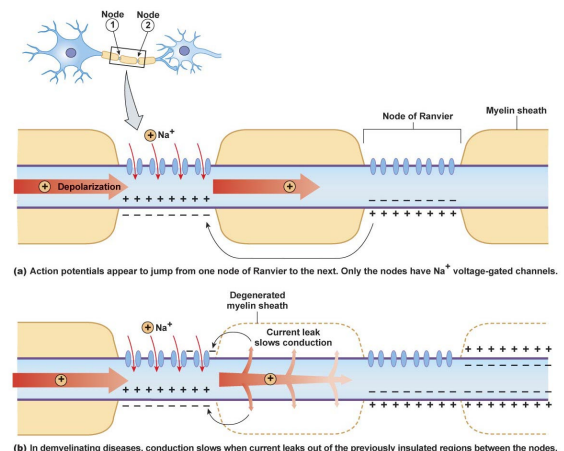


Figure 8-20

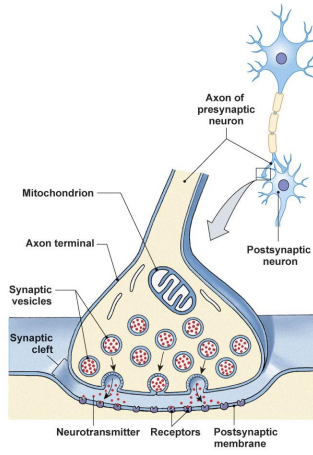


Figure 8-21, overview

- 1 An action potential depolarizes the axon terminal.
- 2 The depolarization opens voltage-gated Ca^{2+} channels and Ca^{2+} enters the cell.
- 3 Calcium entry triggers exocytosis of synaptic vesicle contents.
- 4 Neurotransmitter diffuses across the synaptic cleft and binds with receptors on the postsynaptic cell.
- 5 Neurotransmitter binding initiates a response in the postsynaptic cell.

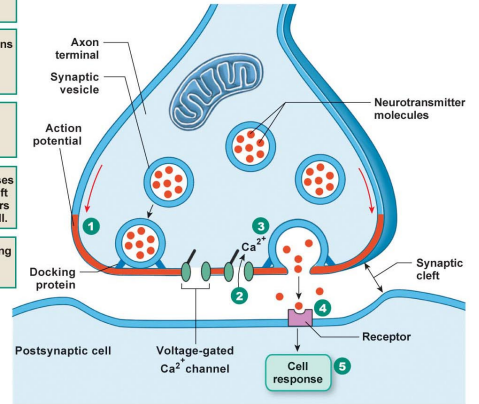
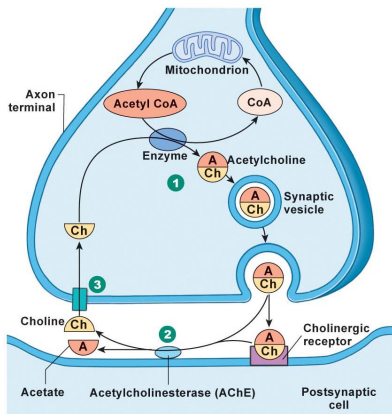


Figure 8-22, overview



- 1 Acetylcholine (ACh) is made from choline and acetyl CoA.
- 2 In the synaptic cleft ACh is rapidly broken down by the enzyme acetylcholinesterase.
- 3 Choline is transported back into the axon terminal and is used to make more ACh.

Figure 8-23

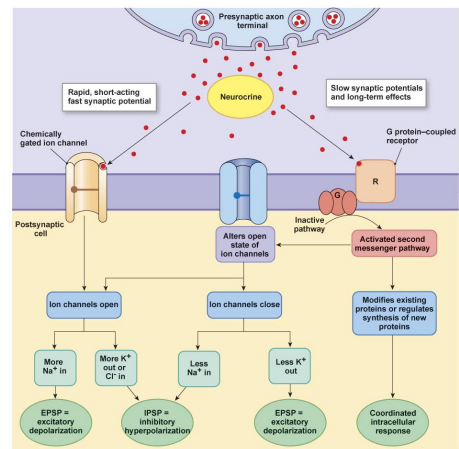


Figure 8-24, overview

- 1 Neurotransmitters can be returned to axon terminals for reuse or transported into glial cells.
- 2 Enzymes inactivate neurotransmitters.
- 3 Neurotransmitters can diffuse out of the synaptic cleft.

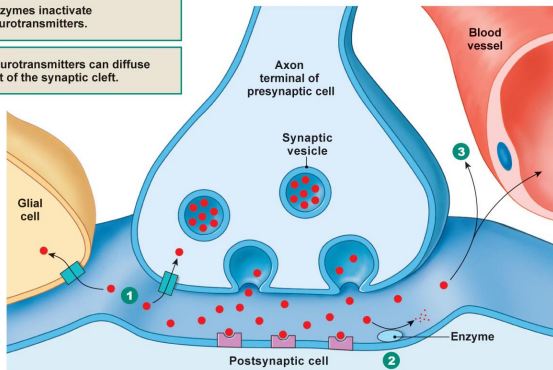


Figure 8-25

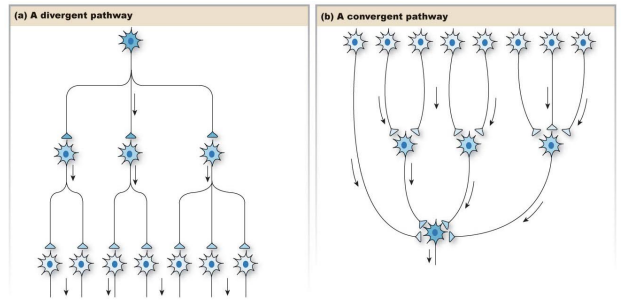


Figure 8-26

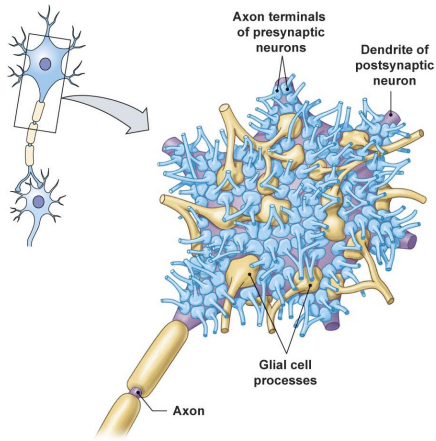


Figure 8-28a, overview

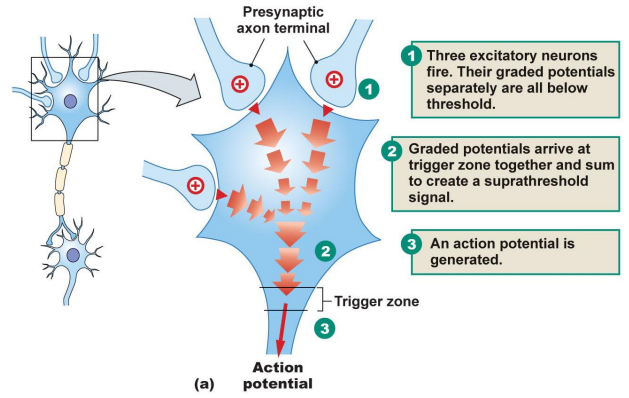


Figure 8-28b, overview

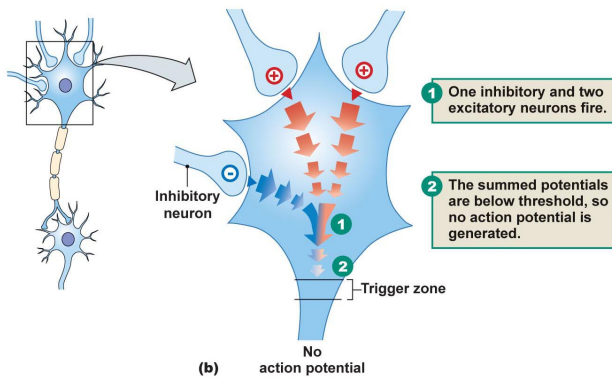


Figure 8-29

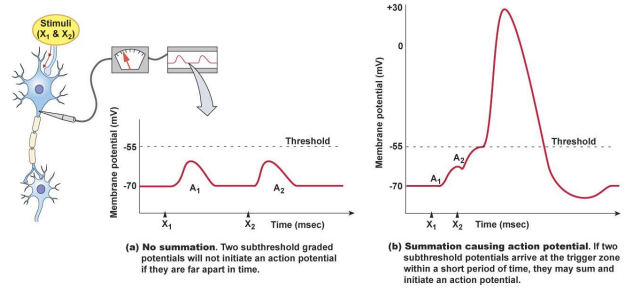


Figure 8-31, overview

