Brain

- Use ONLY glucose
- Depends on incoming glucose
- Can use β-hydroxybutyrate
- Glycolysis, CAC – ATP energy required for neurons
- $Na^+K^+ATPase$ – membrane potential

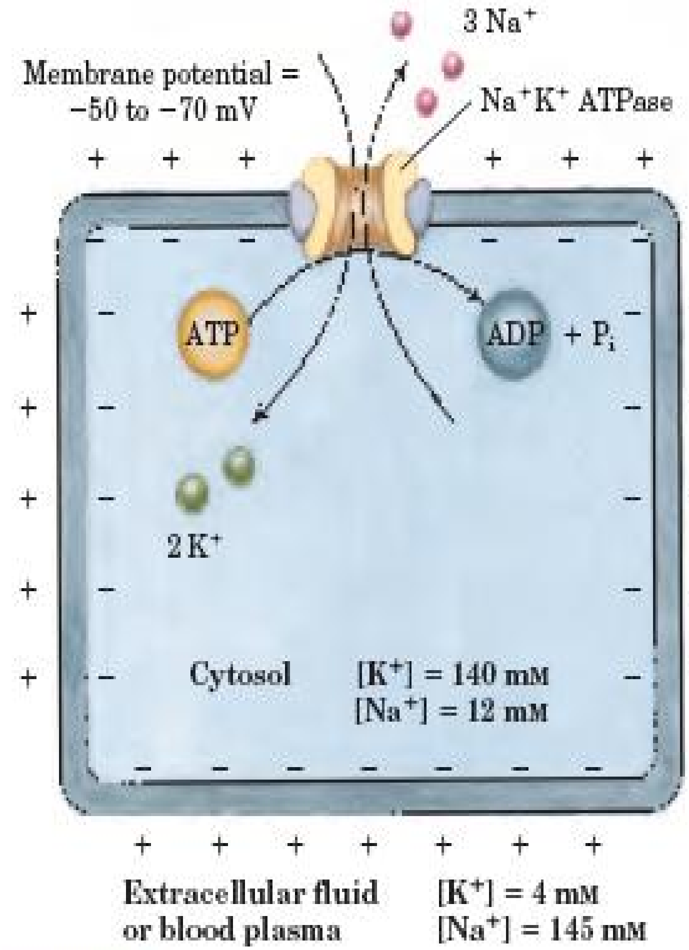


FIGURE 11-36 Na^+K^+ ATPase. In animal cells, this active transport system is primarily responsible for setting and maintaining the intracellular concentrations of Na^+ and K^+ and for generating the transmembrane electrical potential. It does this by moving three Na^+ out of the cell for every two K^+ it moves in. The electrical potential is central to electrical signaling in neurons, and the gradient of Na^+ is used to drive the uphill cotransport of solutes in many cell types.

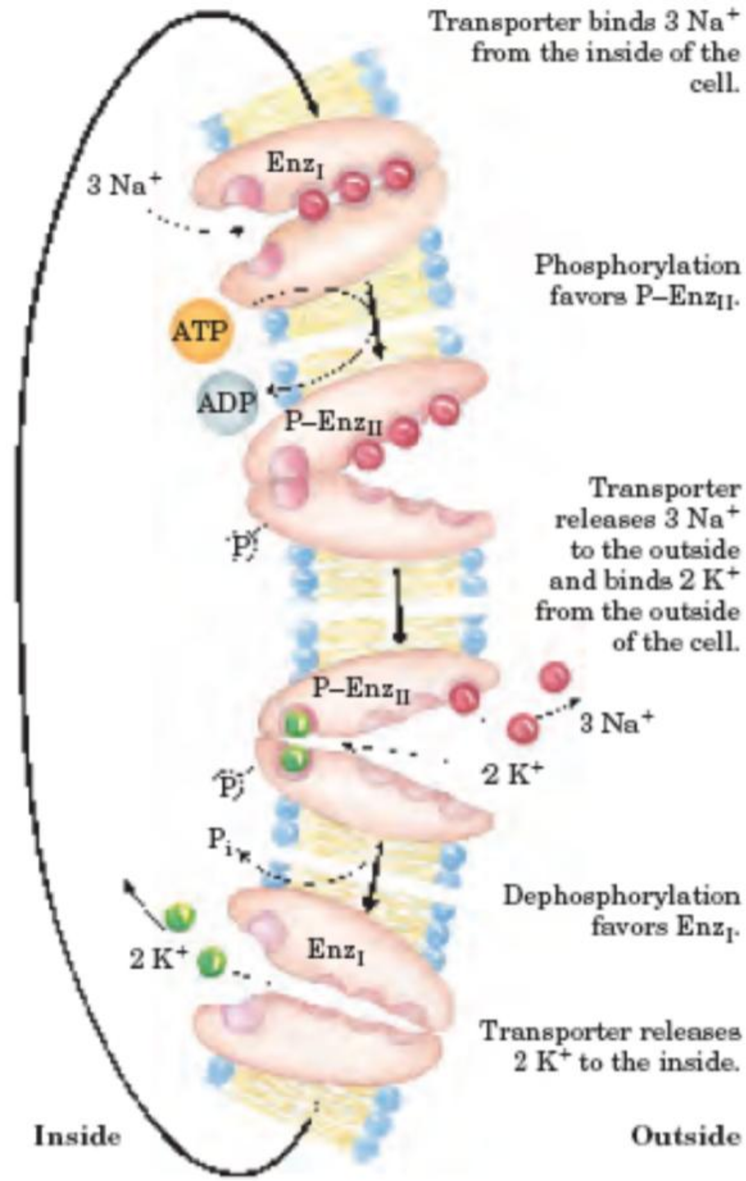
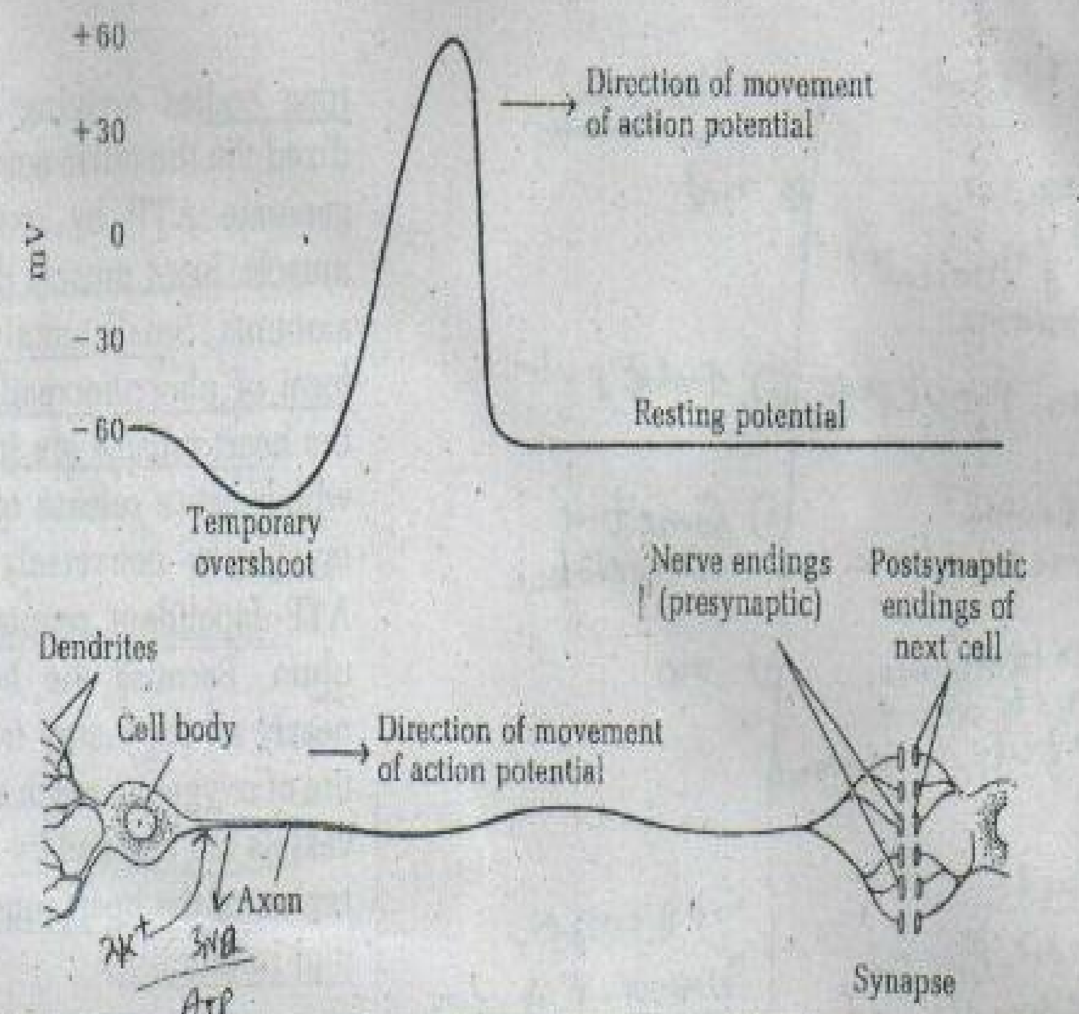


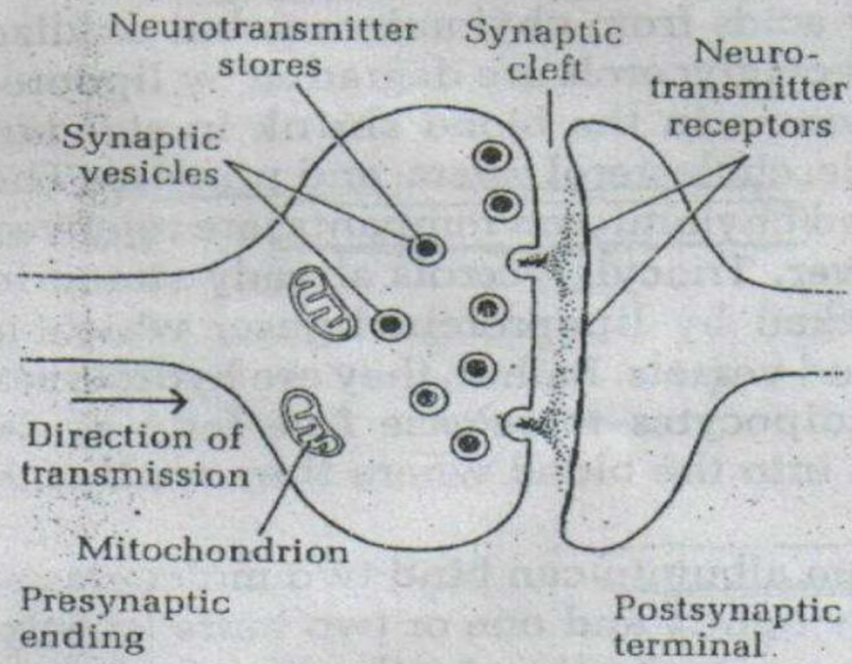
FIGURE 11-37 Postulated mechanism of Na^+ and K^+ transport by the Na^+K^+ ATPase.

Figure 24-14

A neuron and the action potential. Impulses received by the dendrites are transmitted as a wavelike action potential along the axon to the next neuron. The resting potential is normally −60 mV *(negative inside). The reversal of the sign of the potential results from a rapid transient influx of* Na^+ *from the extracellular space due to selective opening of* Na^+ *gates. The resting potential is restored by the action of the* Na^+K^+*-transporting ATPase of the axonal membrane.*



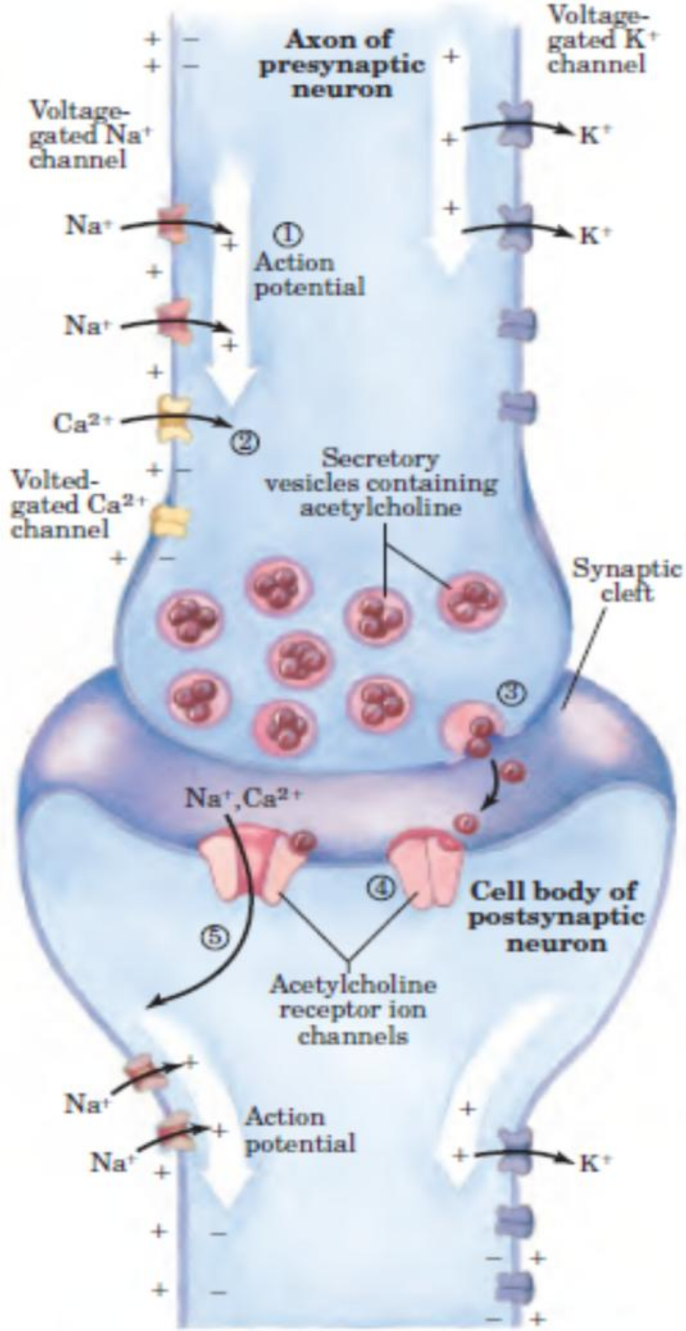
- Neurotransmitter synthesis – need ATP



(a)

Figure 24-15

(a) *Drawing of a synapse, showing its major functional components. The mitochondria provide ATP for concentrating the neurotransmitter in the secretory vesicles, as well as the energy for reabsorbing the neurotransmitter from the synaptic cleft.* (b) *An electron micrograph showing the release of neurotransmitters from the secretory vesicles into a neuromuscular junction.*


Axon of presynaptic neuron
Voltage-gated K+ channel
K+
K+
Voltage-gated Na+ channel
Na+
Na+
① Action potential
Ca2+
②
Volted-gated Ca2+ channel
Secretory vesicles containing acetylcholine
Synaptic cleft
③
Na+, Ca2+
④
⑤
Cell body of postsynaptic neuron
Acetylcholine receptor ion channels
Na+
Na+
Action potential
K+

- Amino acids, amino acid derivatives
- Acetylcholine esterase