Figure 5-1

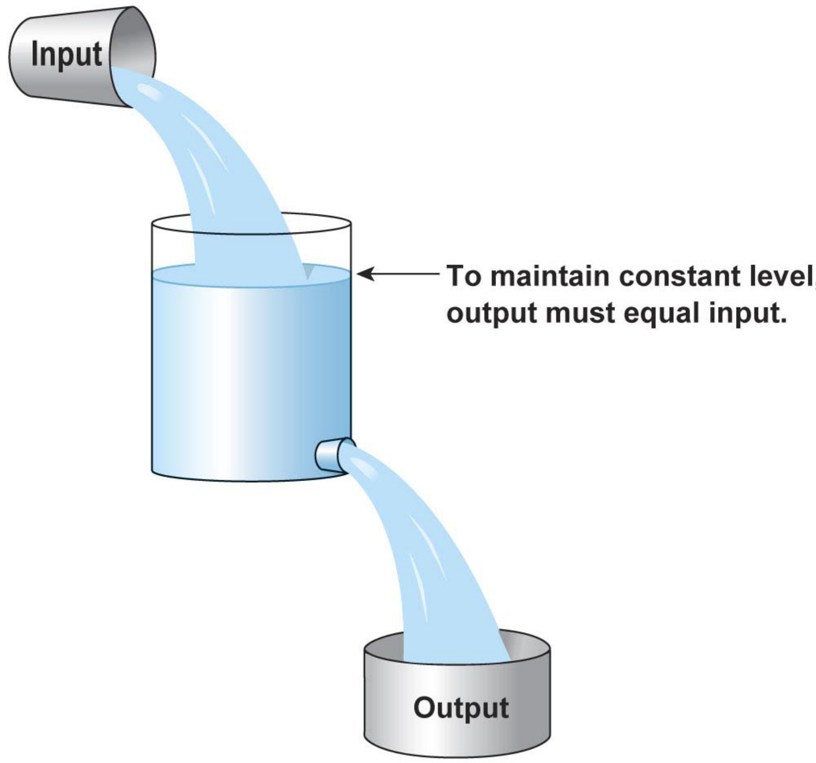


Figure 5-2

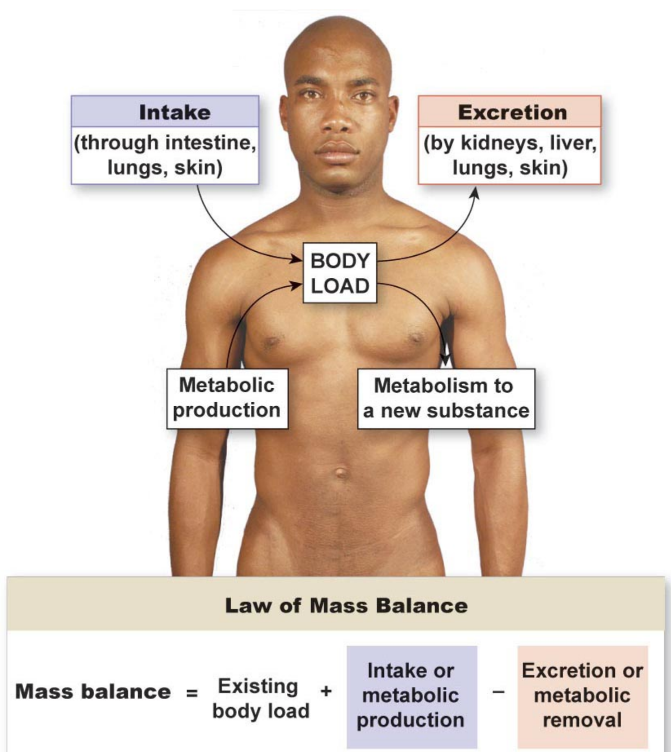


Figure 5-3

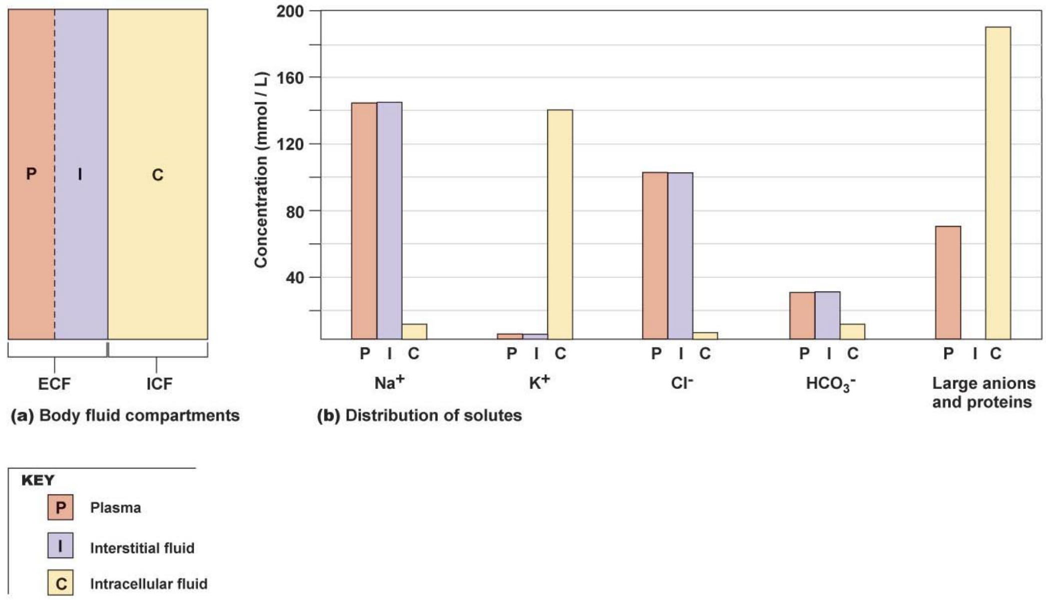


Figure 5-4

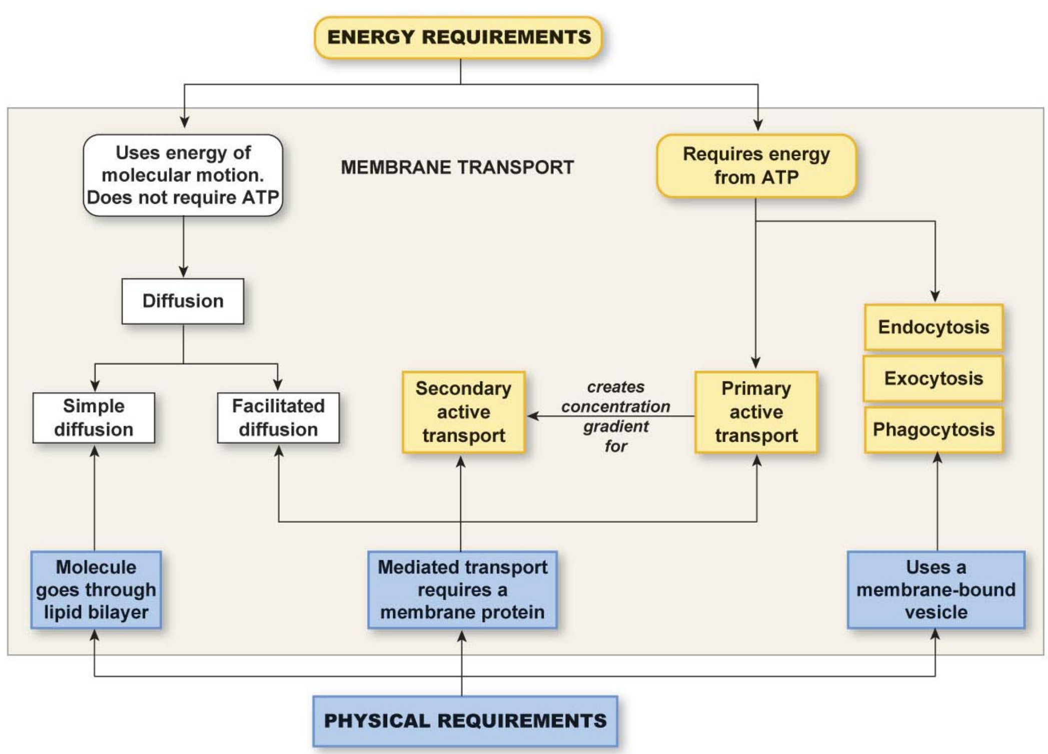


Figure 5-5

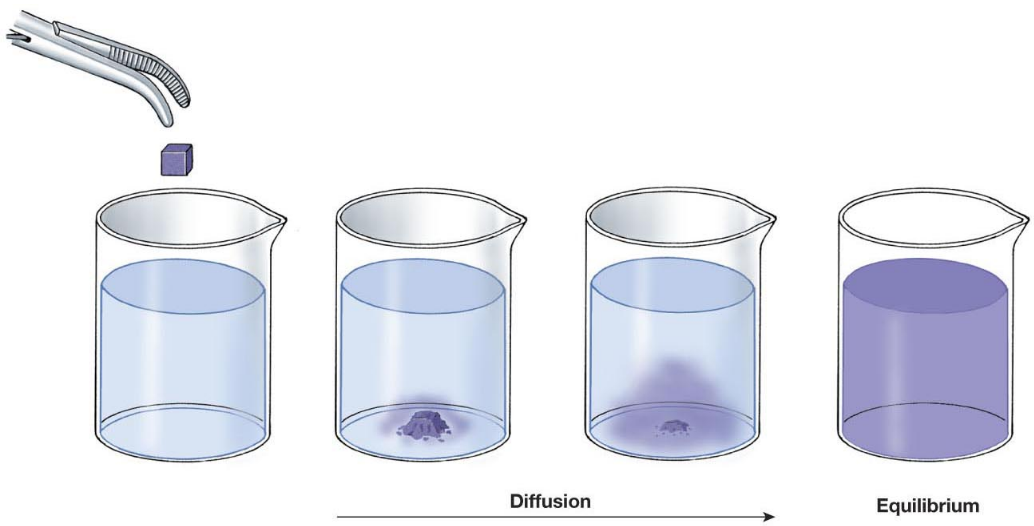
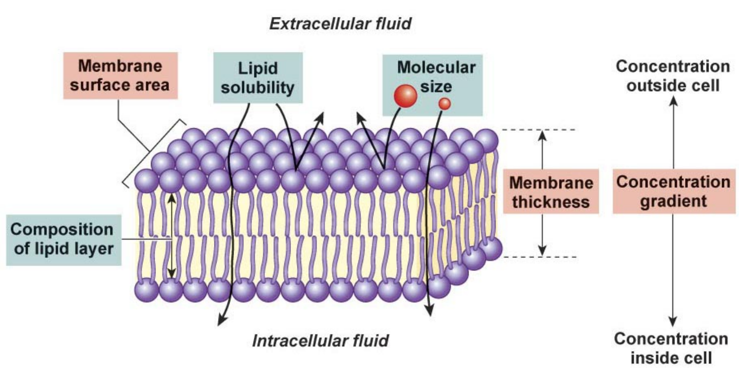


Figure 5-6, overview



Fick's Law of Diffusion says:

$$\text{Rate of diffusion} \propto \frac{\text{surface area} \cdot \text{concentration gradient} \cdot \text{membrane permeability}}{\text{membrane thickness}}$$

Membrane permeability

$$\text{Membrane permeability} \propto \frac{\text{lipid solubility}}{\text{molecular size}}$$

Changing the composition of the lipid layer can increase or decrease membrane permeability.

Table 5-1, part 1

TABLE 5-1 Rules for Diffusion of Uncharged Molecules

General Properties of Diffusion

1. Diffusion uses the kinetic energy of molecular movement and does not require an outside energy source.
2. Molecules diffuse from an area of higher concentration to an area of lower concentration.
3. Diffusion continues until concentrations come to equilibrium. Molecular movement continues, however, after equilibrium has been reached.
4. Diffusion is faster
   —along higher concentration gradients.
   —over shorter distances.
   —at higher temperatures.
   —for smaller molecules.
5. Diffusion can take place in an open system or across a partition that separates two systems.

Table 5-1, part 2

TABLE 5-1 Rules for Dif fusion of Uncharged Molecules *(continued)*

Simple Diffusion Across a Membrane

6. The rate of diffusion through a membrane is faster if
   —the membrane's surface area is larger.
   —the membrane is thinner.
   —the concentration gradient is larger.
   —the membrane is more permeable to the molecule.
7. Membrane permeability to a molecule depends on
   —the molecule's lipid solubility.
   —the molecule's size.
   —the lipid composition of the membrane.

Figure 5-7, overview

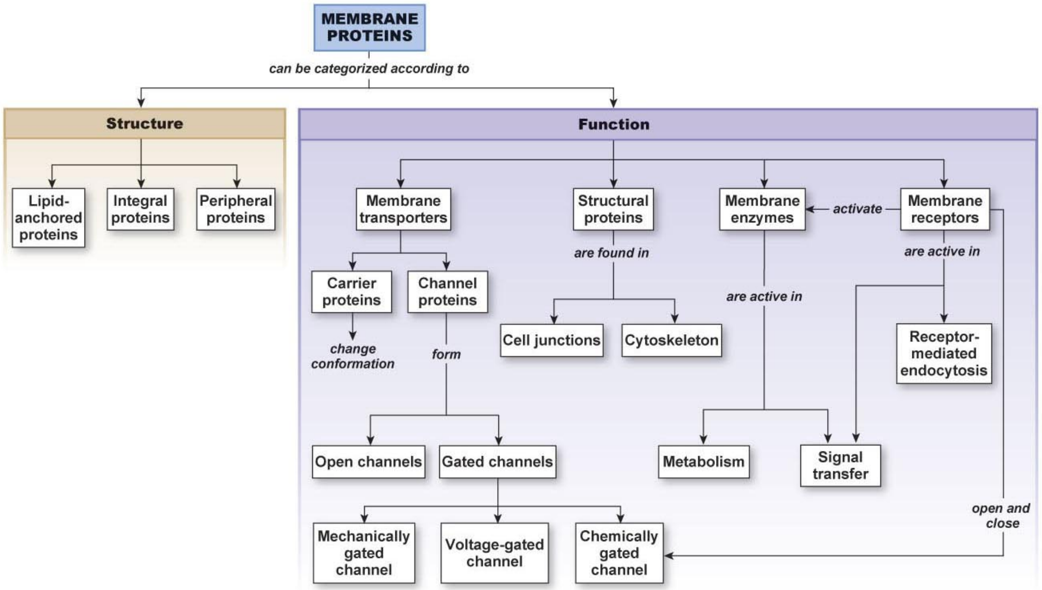


Figure 5-8

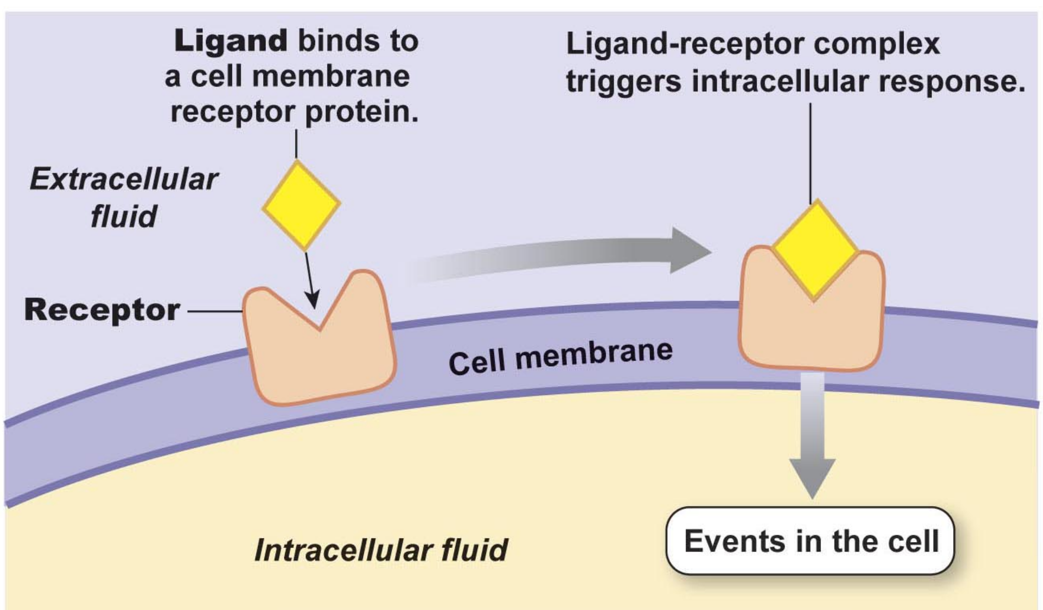


Figure 5-9, overview

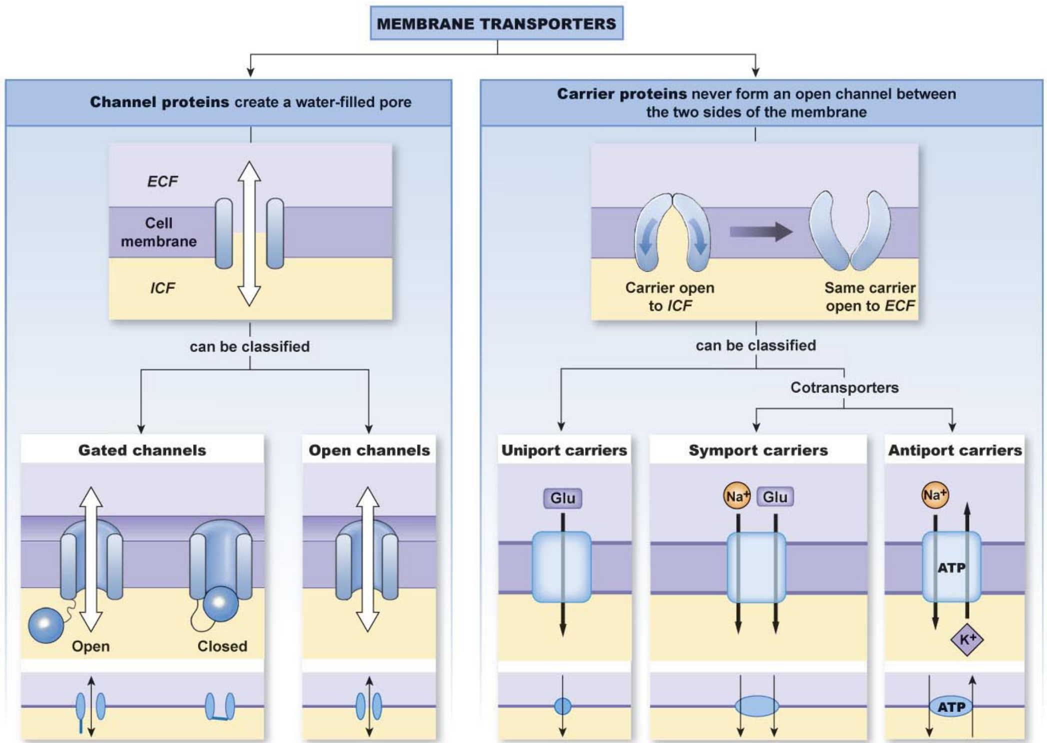


Figure 5-11

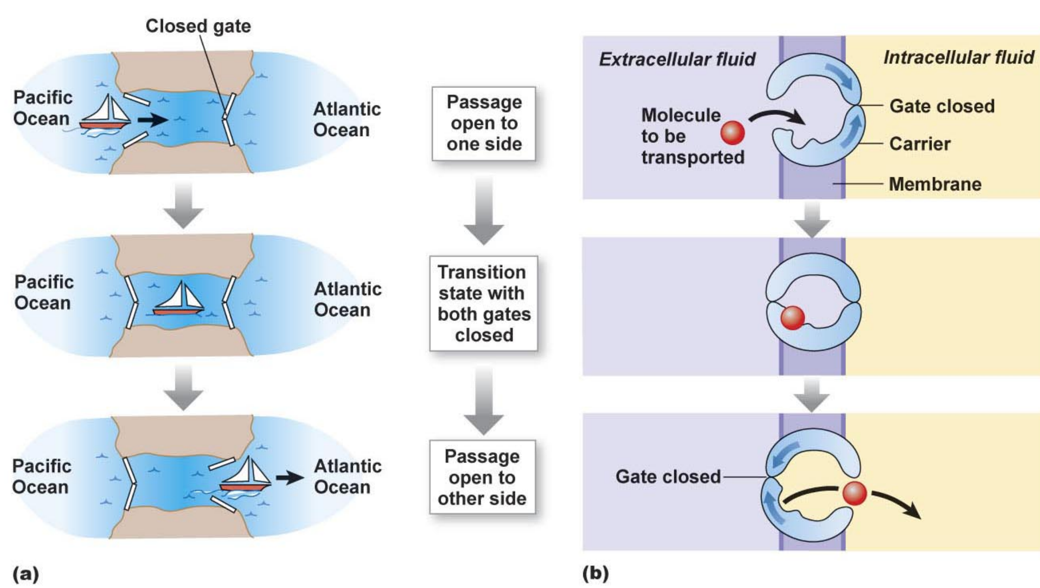
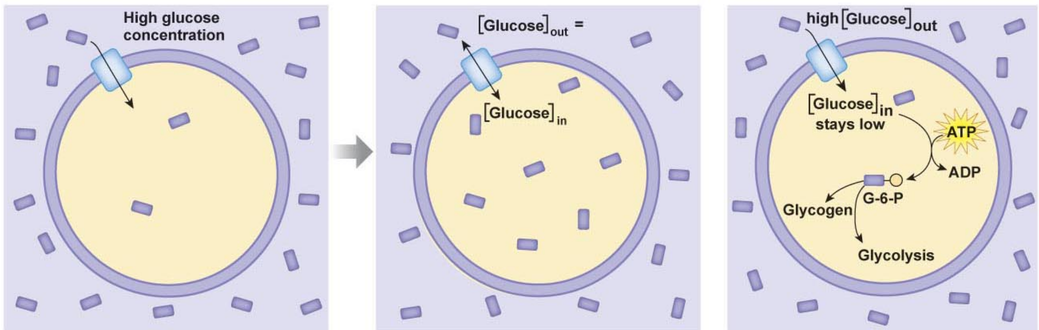


Figure 5-12



(a) Facilitated diffusion (b) Diffusion reaches equilibrium (c) Conversion

Table 5-2

TABLE 5-2 Primary Active Transporters

NAMES	TYPE OF TRANSPORT
Na^+-K^+-ATPase or sodium-potassium pump	Antiport
Ca^{2+}-ATPase	Uniport
H^+-ATPase or proton pump	Uniport
H^+-K^+-ATPase	Antiport

Figure 5-13

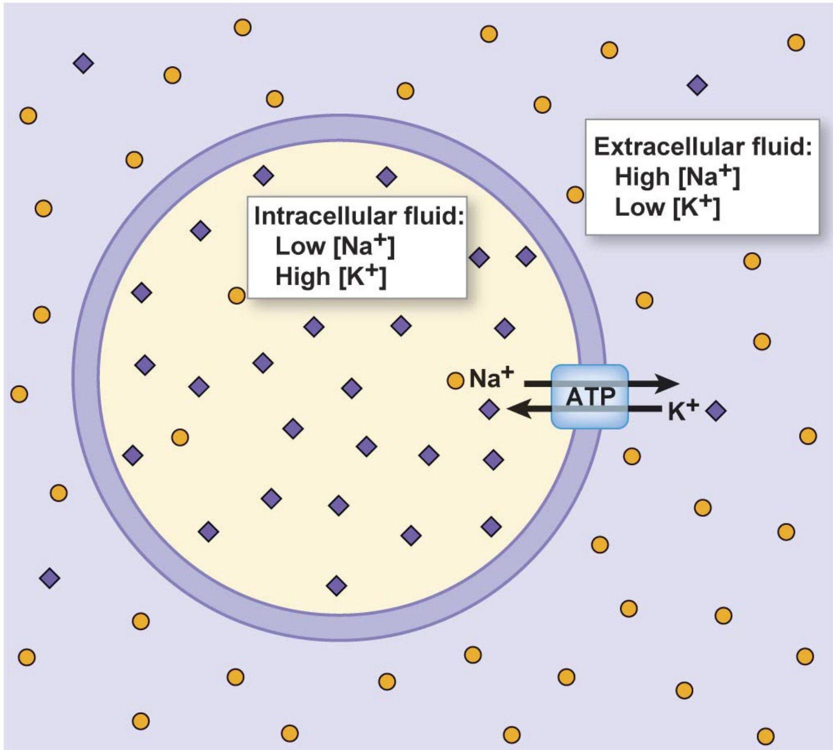


Figure 5-14, overview

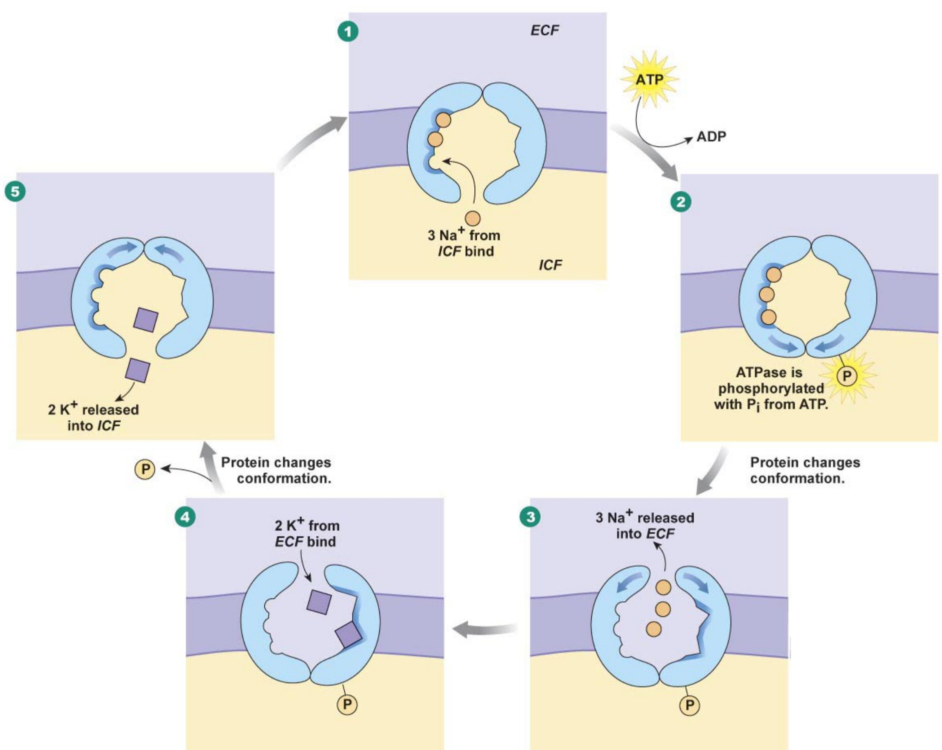


Figure 5-15, overview

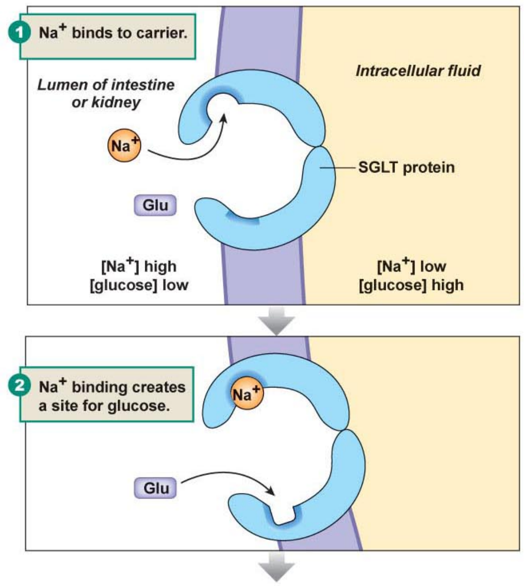


Figure 5-16, overview

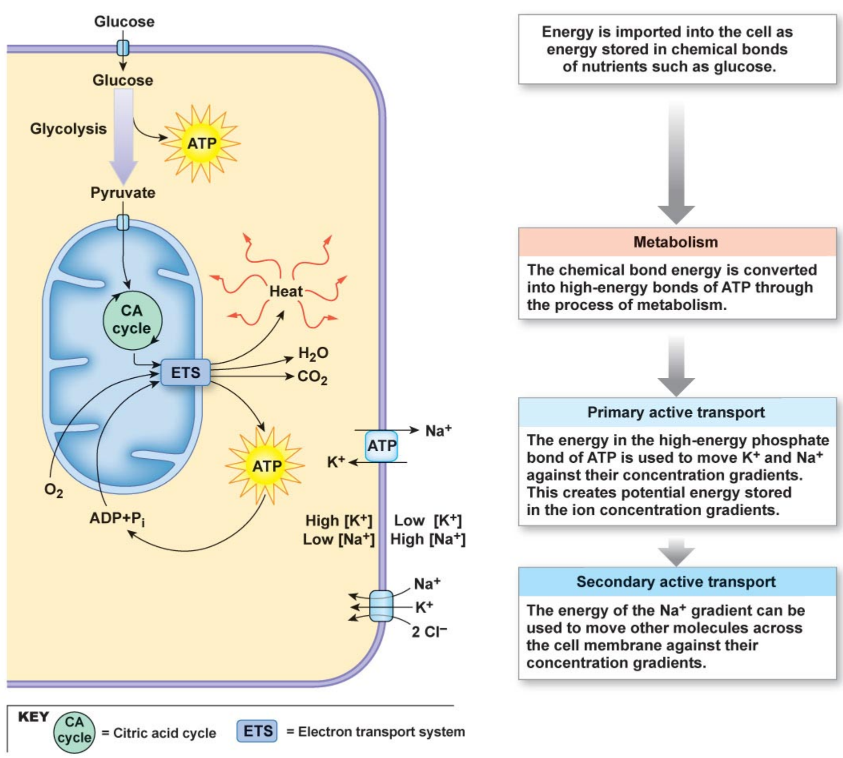
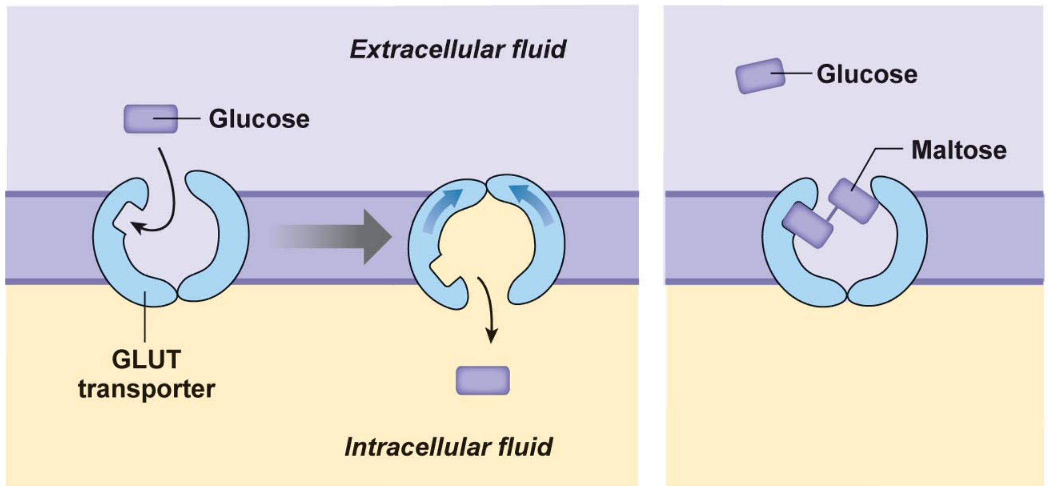


Figure 5-18



(a) The GLUT transporter

(b) Maltose

Figure 5-17

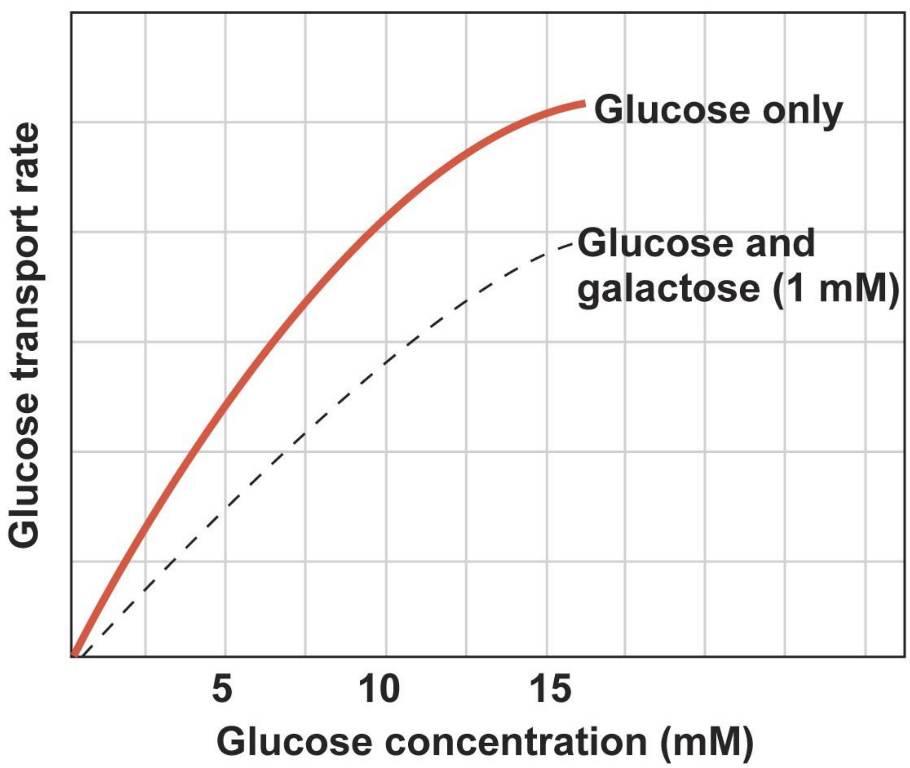


Figure 5-19

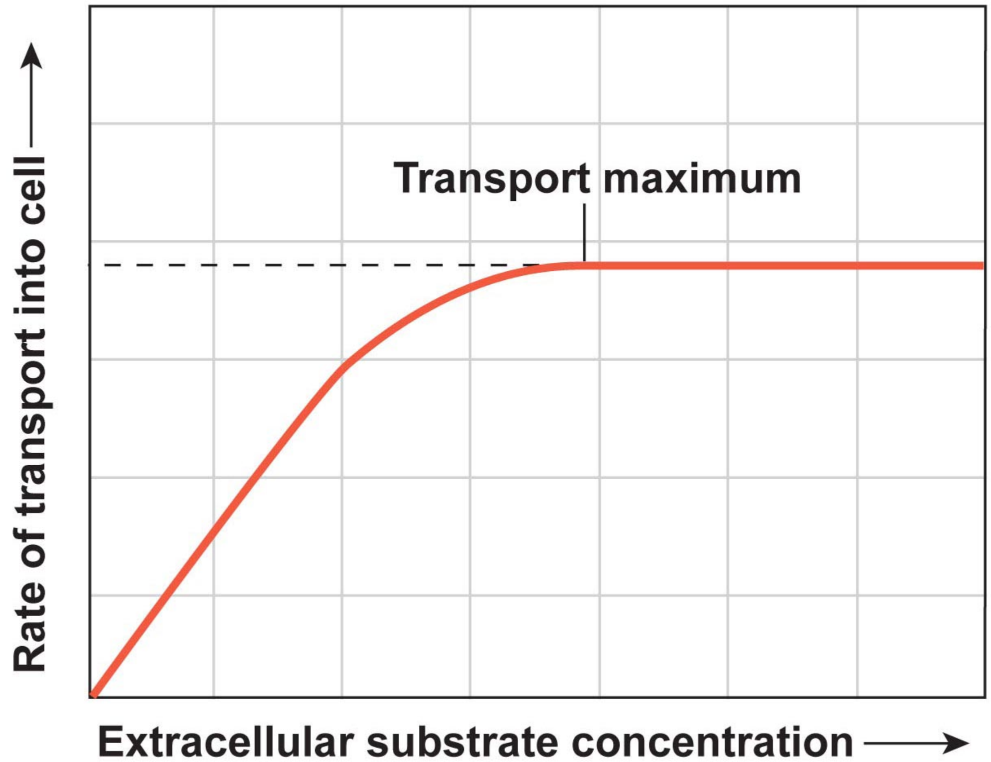


Figure 5-20, overview

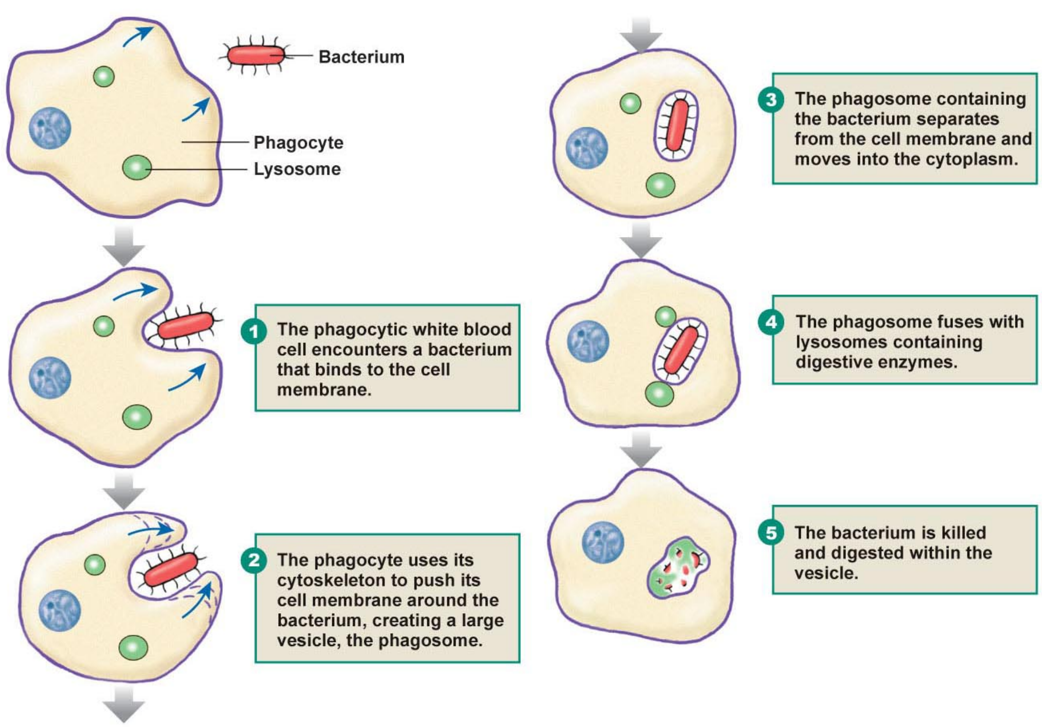


Figure 5-21, overview

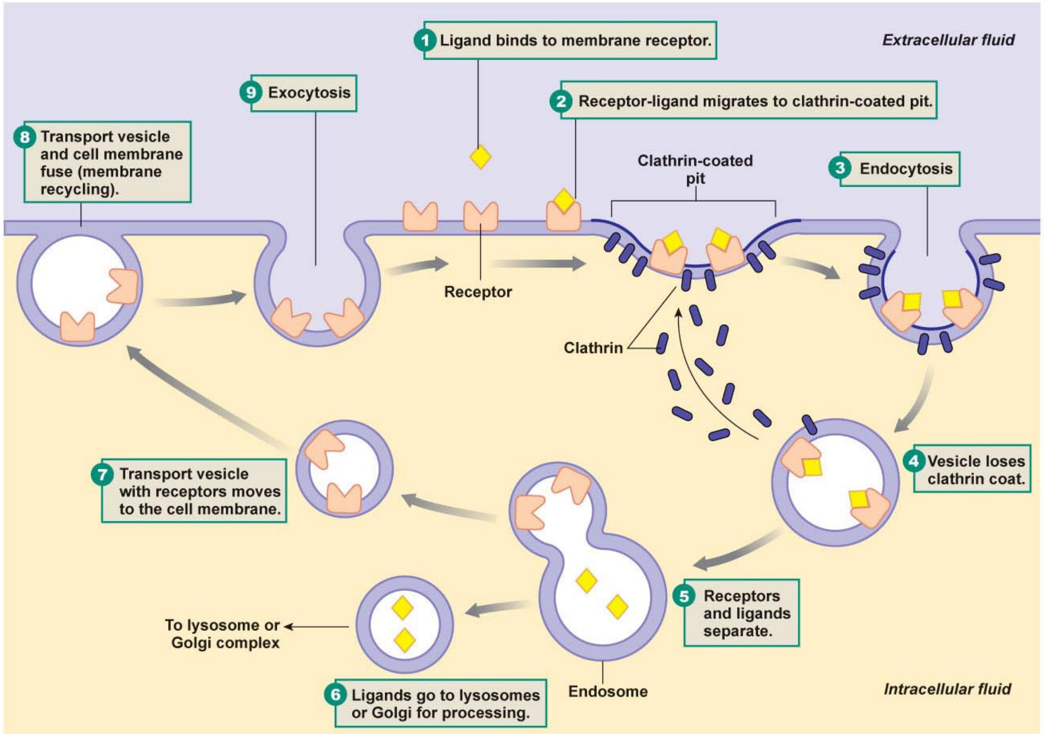
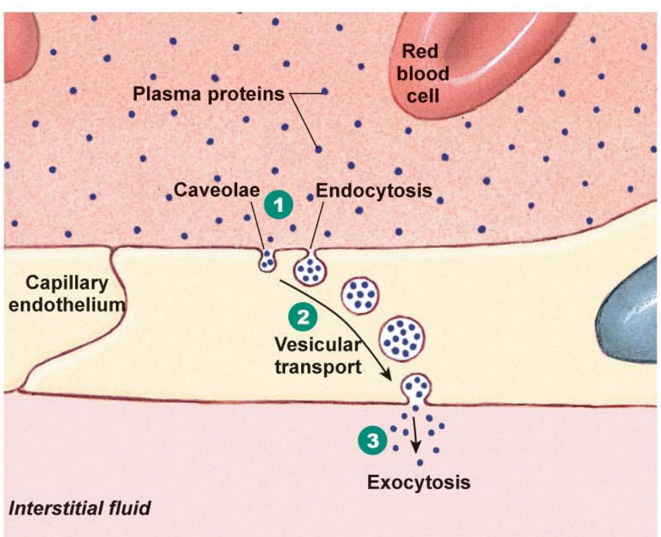


Figure 5-24



1 Plasma proteins are concentrated in caveolae, which then undergo endocytosis and form vesicles.

2 Vesicles cross the cell with help from the cytoskeleton.

3 Vesicle contents are released into interstitial fluid by exocytosis.

Figure 5-25

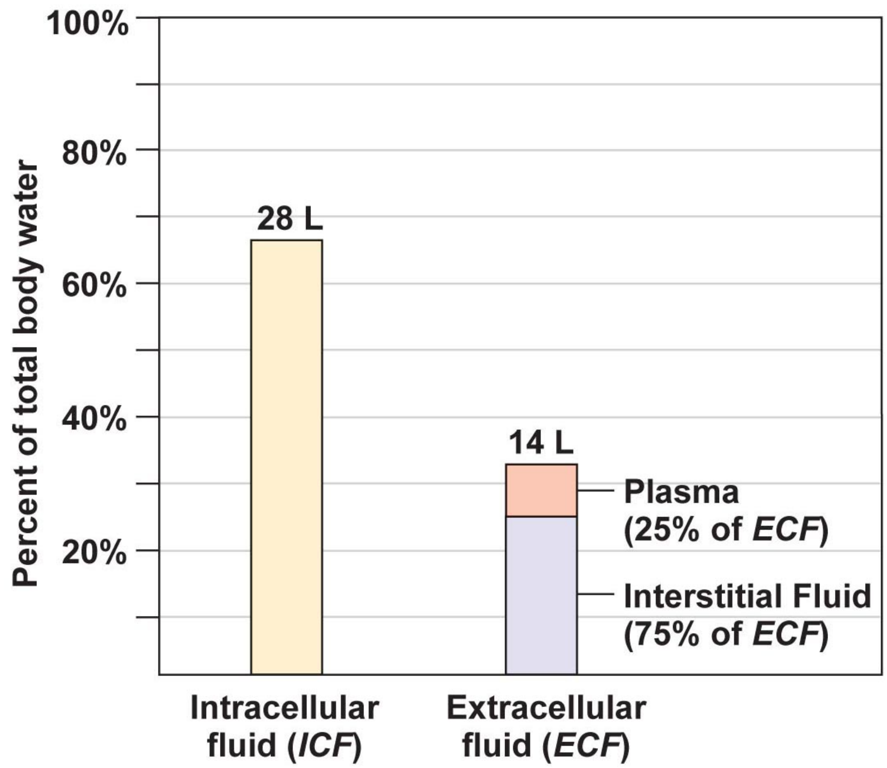


Figure 5-26, overview

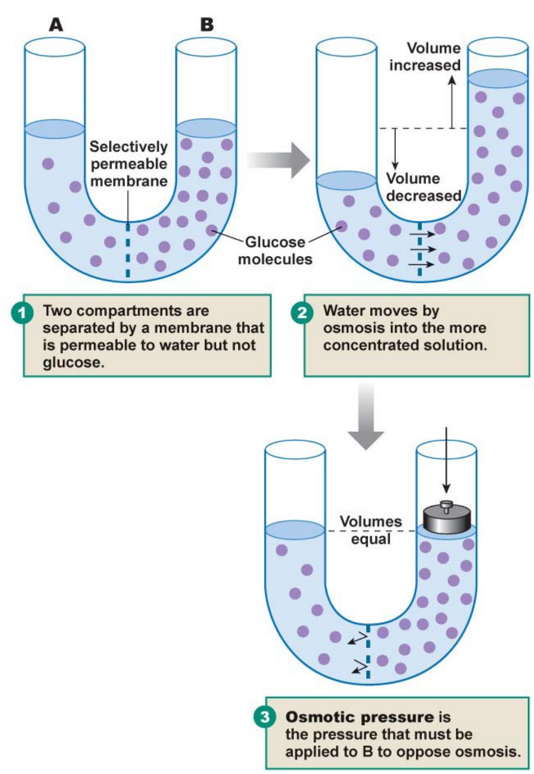


Figure 5-27

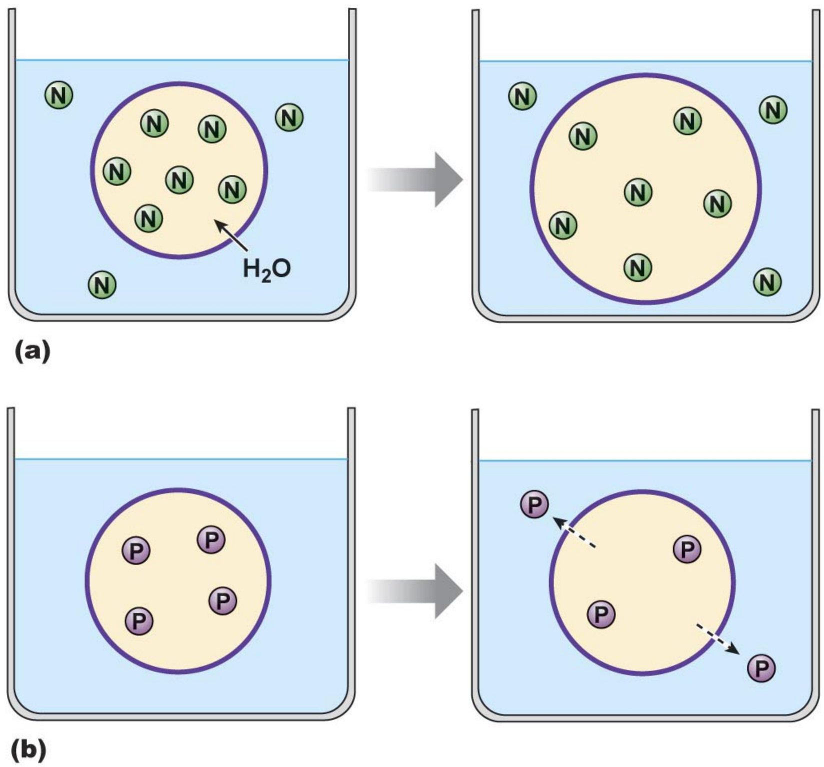


Figure 5-28

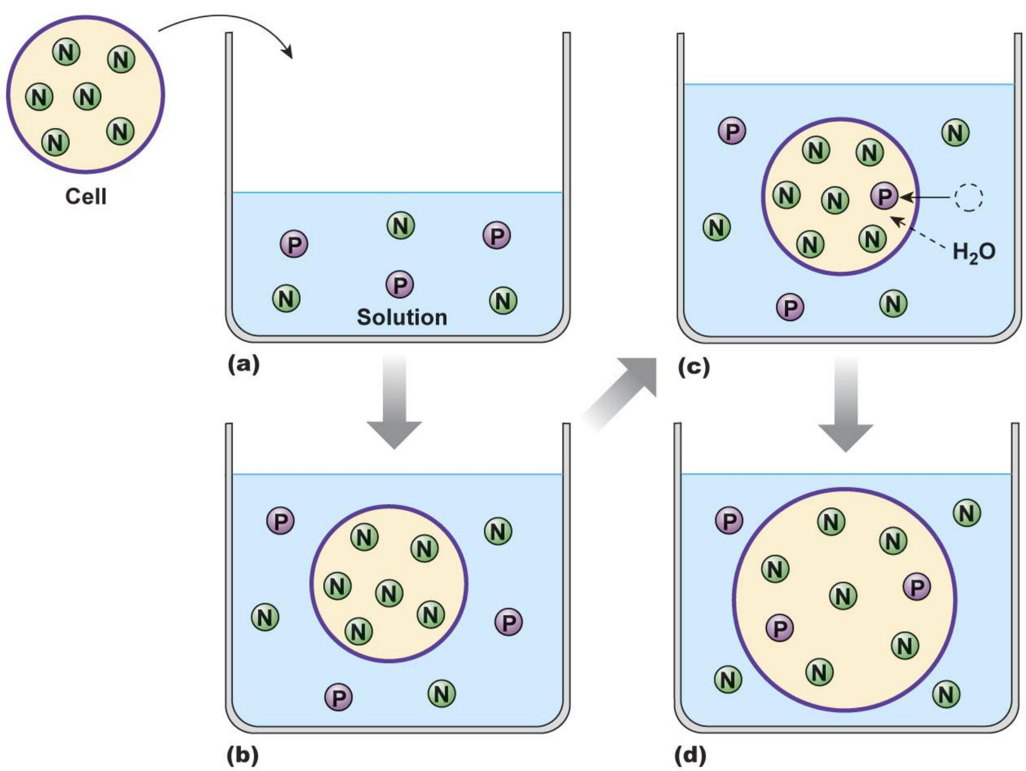


Table 5-5

TABLE 5-5 Comparing Osmolarities

SOLUTION A = 1 OsM GLUCOSE	SOLUTION B = 2 OsM GLUCOSE	SOLUTION C = 1 OsM NACL
A is hyposmotic to B	B is hyperosmotic to A	C is isosmotic to A
A is isosmotic to C	B is hyperosmotic to C	C is hyposmotic to B

Table 5-6

TABLE 5-6 Tonicity of Solutions

SOLUTION	CELL BEHAVIOR WHEN PLACED IN THE SOLUTION	DESCRIPTION OF THE SOLUTION RELATIVE TO THE CELL
A	Cell swells	Solution A is hypotonic
B	Cell doesn't change size	Solution B is isotonic
C	Cell shrinks	Solution C is hypertonic

Figure 5-29

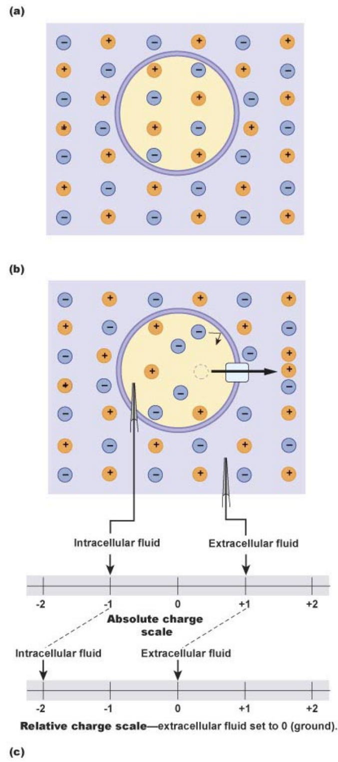


Figure 5-29a

(a) Cell and solution are electrically and chemically at equilibrium.

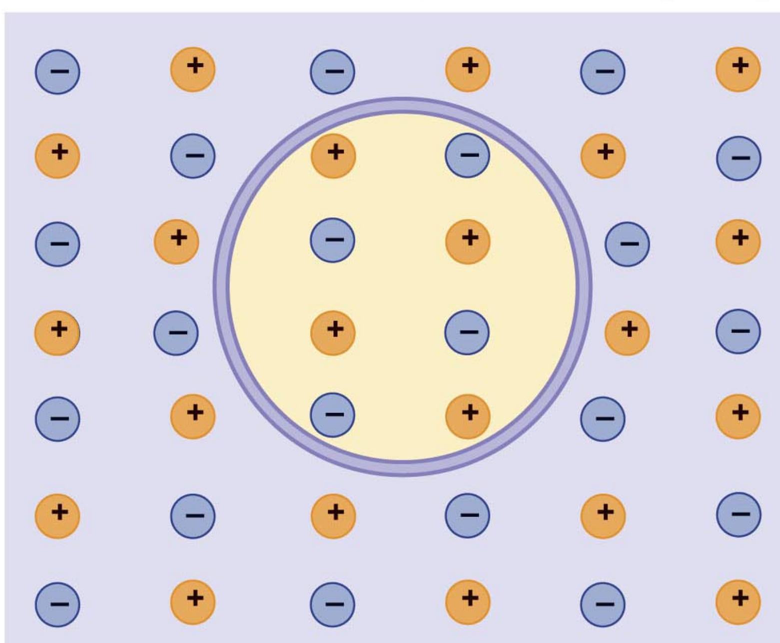


Figure 5-29b

(b) Cell and solution in chemical and electrical disequilbrium.

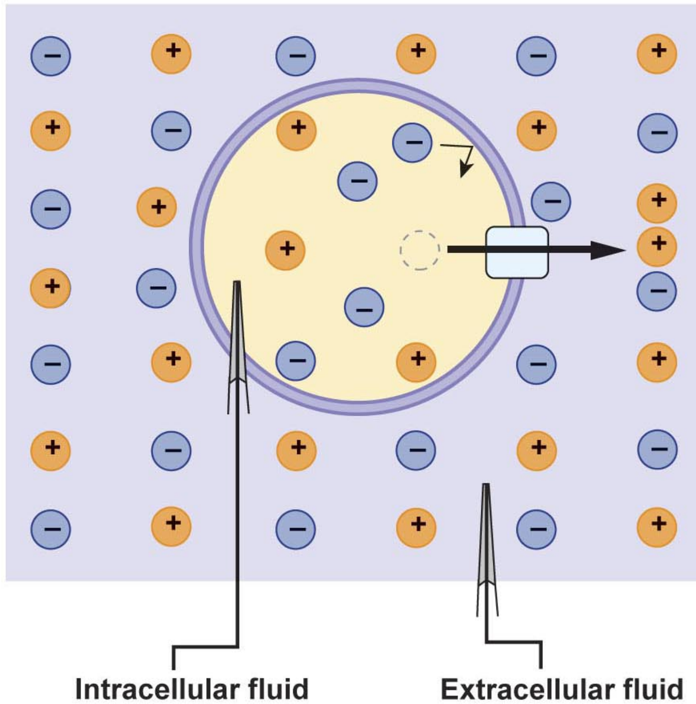
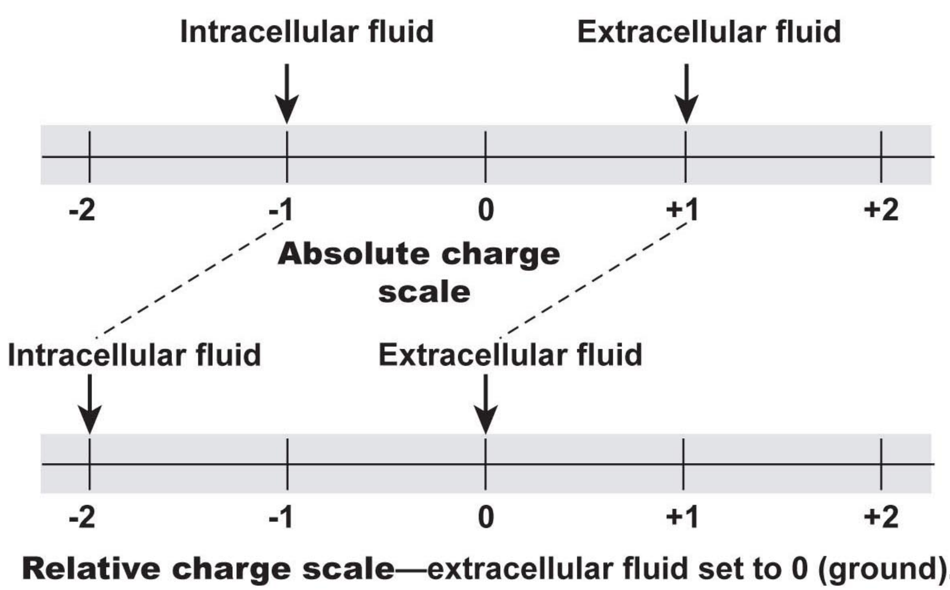


Figure 5-29c



(c) On an absolute charge scale, the extracellular fluid *(ECF)* would be at +1 and the intracellular fluid *(ICF)* at -1.

Figure 5-30

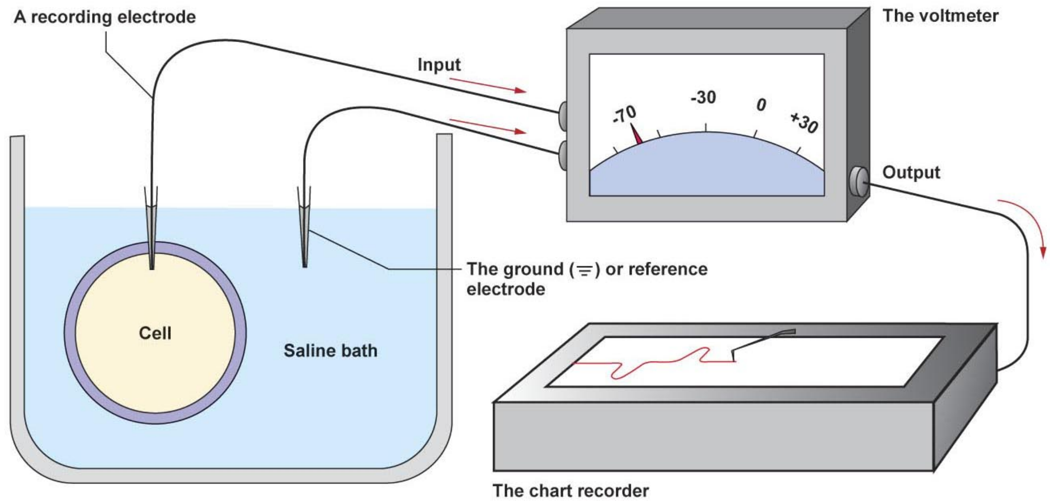


Figure 5-33

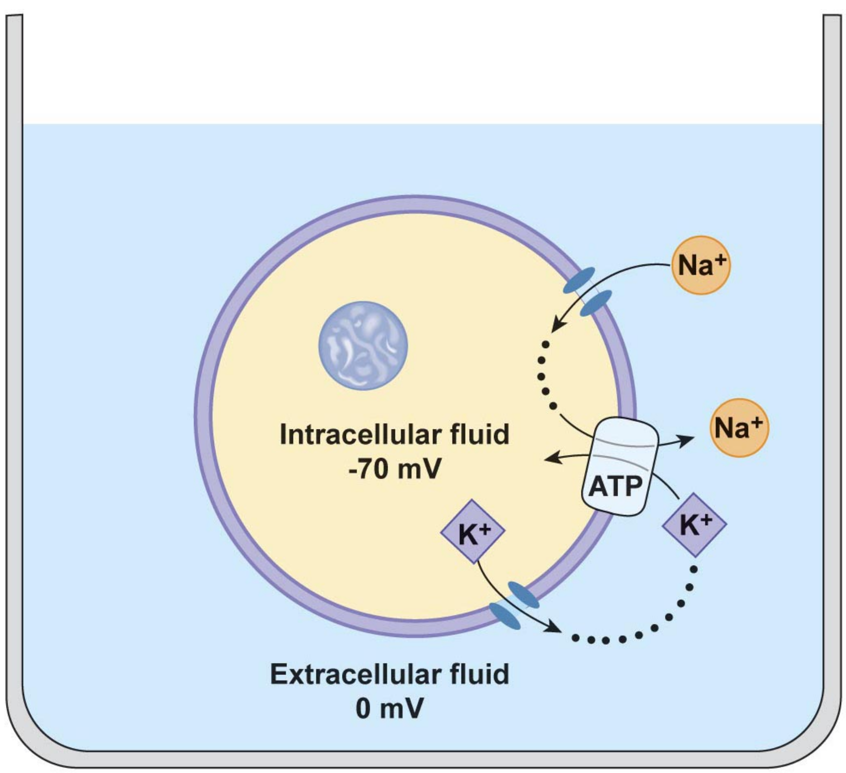


Figure 5-34

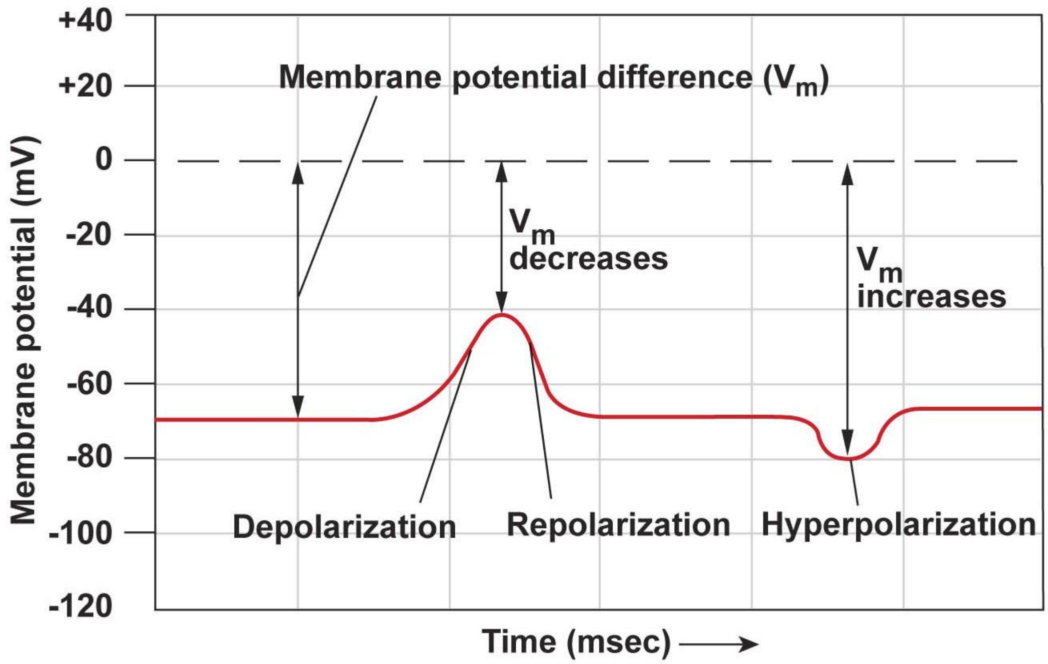


Figure 5-35