

Sodium-Potassium Pump in the Cell Membrane

The process of active transport allows a cell to maintain its proper electrolyte balance. To keep the ion concentrations at the proper levels shown in Table 1B, a sodium-potassium pump embedded in the cell membrane shuttles sodium ions out of the cell across the cell membrane. A model for the action of the sodium-potassium pump is shown below.

Nerve Impulses and Ion Concentration

The difference in Na^+ and K^+ concentrations inside and outside nerve cell membranes is essential for the

normal operation of the nervous system. This unequal concentration of ions creates a voltage across nerve cell membranes. When a nerve cell is stimulated, sodium ions diffuse into the cell from the surrounding fluid, raising voltage across the nerve cell membrane from -70 mV to nearly $+60$ mV. Potassium ions then diffuse out of the cell into the surrounding fluid, restoring the voltage across the nerve cell membrane to -70 mV. This voltage fluctuation initiates the transmission of a nerve impulse. The amount of Na^+ inside the cell has increased slightly, and the amount of K^+ outside the cell has decreased. But the sodium-potassium pump will restore these ions to their proper concentrations.

