

More on the  
**The Sodium-Potassium Pump**

by:

Mary V. Andrianopoulos, Ph.D.

# What is the Sodium-Potassium Pump?

- The **S-P pump** is a on-going process of maintaining the permeability of the cell membrane to specific ions to ensure that the resting membrane potential is at a level that enables an action potential (or nerve impulse) to be possible at any time.
- The cell membrane needs to be more negative (polarized) intra-cellularly for this to be accomplished.

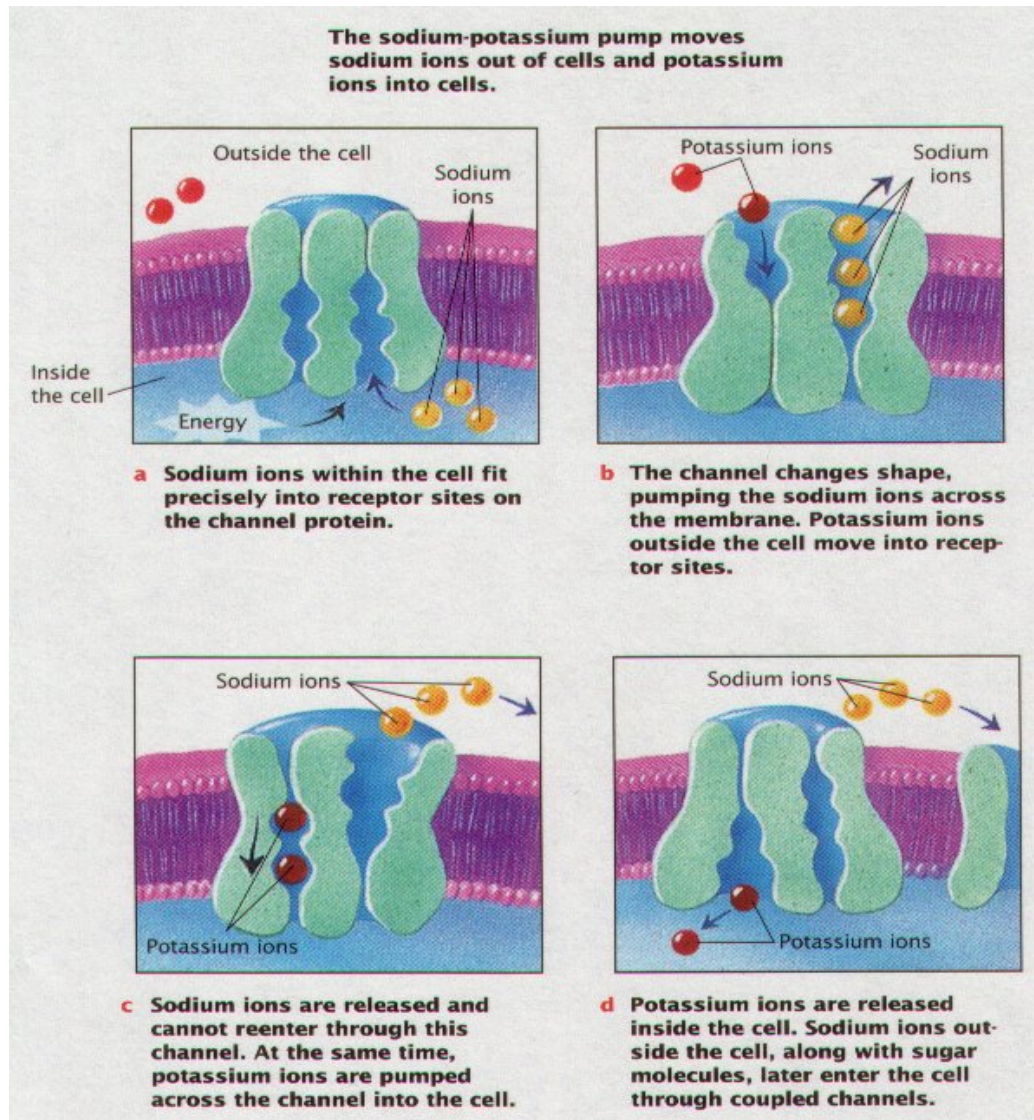
# Permeability of K<sup>+</sup>

- The **S-P pump** is really an enzyme process that breaks down ATP by using internal Na<sup>+</sup> ions in the neuron cell.
- The energy (ATP → ADP) released drives the pump to ensure that **internal Na<sup>+</sup>** is exchanged for **external K<sup>+</sup>** (2 K<sup>+</sup> ions for 3 Na<sup>+</sup> ions)
- This allows the intracellular charge to reach -70 mV to -80 mV or **resting membrane potential** to set an environment for action potentials to occur with proper stimulation and release of neurotransmitter.

# The S-P Pump

- An action potential of a neuronal cell membrane depends on a certain ionic concentration intracellularly (more -) so that it is “polarized”.
- The **S-P Pump** functions independently of nerve impulses (or action potentials) that get triggered due to a stimulus in that the **S-P Pump** allows permeability to external  $K^+$  in exchange for intracellular  $Na^+$ . This maximizes the cell membrane potential so that a sufficient stimulus can trigger an action potential (nerve impulse).

# Sodium-Potassium Pump



video: <http://www.youtube.com/watch?v=lzuKhespz20>

