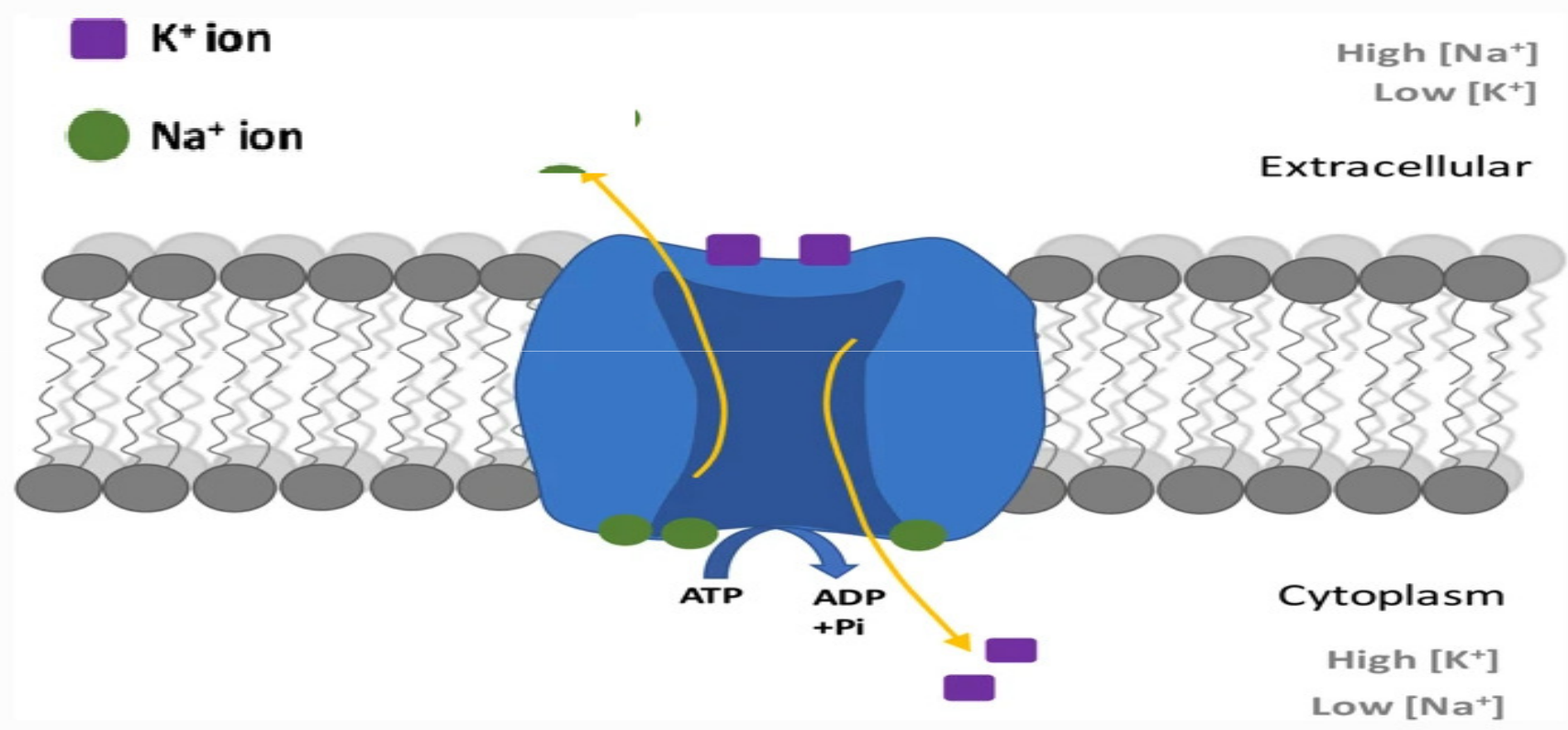
Na^+/K^+ ATPase PUMP

- Na^+/K^+ ATPase (sodium-potassium adenosine triphosphatase), also known as the sodium potassium pump (Na^+/K^+ pump) is a plasma membrane transport enzyme protein. It transports sodium out of the cell and potassium into the cell against their concentration gradients.
- It is vital to numerous bodily processes, such as nerve cell signaling,heart contractions,and kidney functions.
- The sodium-potassium pump is an example of active transport because energy is required to move the sodium and potassium ions against the concentration gradient.
- This pump helps to maintain the resting potential, effect transport and regulate cellular volume.

FUNCTIONS OF Na^+/K^+ ATPase PUMP

- The main function of the Na+/K+ ATPase pump is to maintain resting potential so that the cells will be keeping in a state of a low concentration of sodium ions and high levels of potassium ions within the cell (intracellular).
- The pump plays a large role in nerve cells and initiating action potentials,
- The process of moving sodium and potassium ions across the cell membrance is an active transport process involving the hydrolysis of ATP to provide the necessary energy that accomplishes the transport of three Na^+ to the outside of the cell and the transport of two K^+ ions to the inside of the cell.

MECHANISM OF Na^+/K^+ ATPase PUMP



A diagram showing the extrusion of 3 Na^+ from the cell while 2 K^+ entering the cell due to the activation of the Na^+/K^+-ATPase enzyme. This results in a raised concentration of intracellular K^+ and a reduced concentration of intracellular Na^+ relative to the interstitial fluid.

REACTION OF Na^+/K^+ ATPase PUMP

- A protein complex called the sodium/potassium pump uses the free energy of hydrolysis of ATP to pump sodium ions Na+ out of the cell and potassium ions K+ in to the cell. The net reaction for active transport of sodium and potassium ions is thought to be:

$$\left.\begin{matrix} 3Na^+(inside) \\ + \\ 2K^+(outside) \end{matrix}\right\} + ATP \rightarrow ADP + phosphate + \left\{\begin{matrix} 3Na^+(outside) \\ + \\ 2K^+(inside) \end{matrix}\right.$$