RAMA UNIVERSITY

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FACULTY OF ENGINEERING &TECHNOLOGY
DEPARTMENT OF BIOTECHNOLOGY

Symport

A *symporter* is an integral membrane protein that is involved in the transport of many differing types of molecules across the cell membrane. The *symporter* works in the plasma membrane and molecules are transported across the cell membrane at the same time.

An example of a symporter is moving glucose up its concentration gradient (often referred to as uphill movement) by using the energy from the movement of sodium ions that are moving down their gradient (downhill movement). All of these types of transporter are types of carrier protein and use energy by hydrolyzing ATP to ADP and a phosphate.

Antiport:

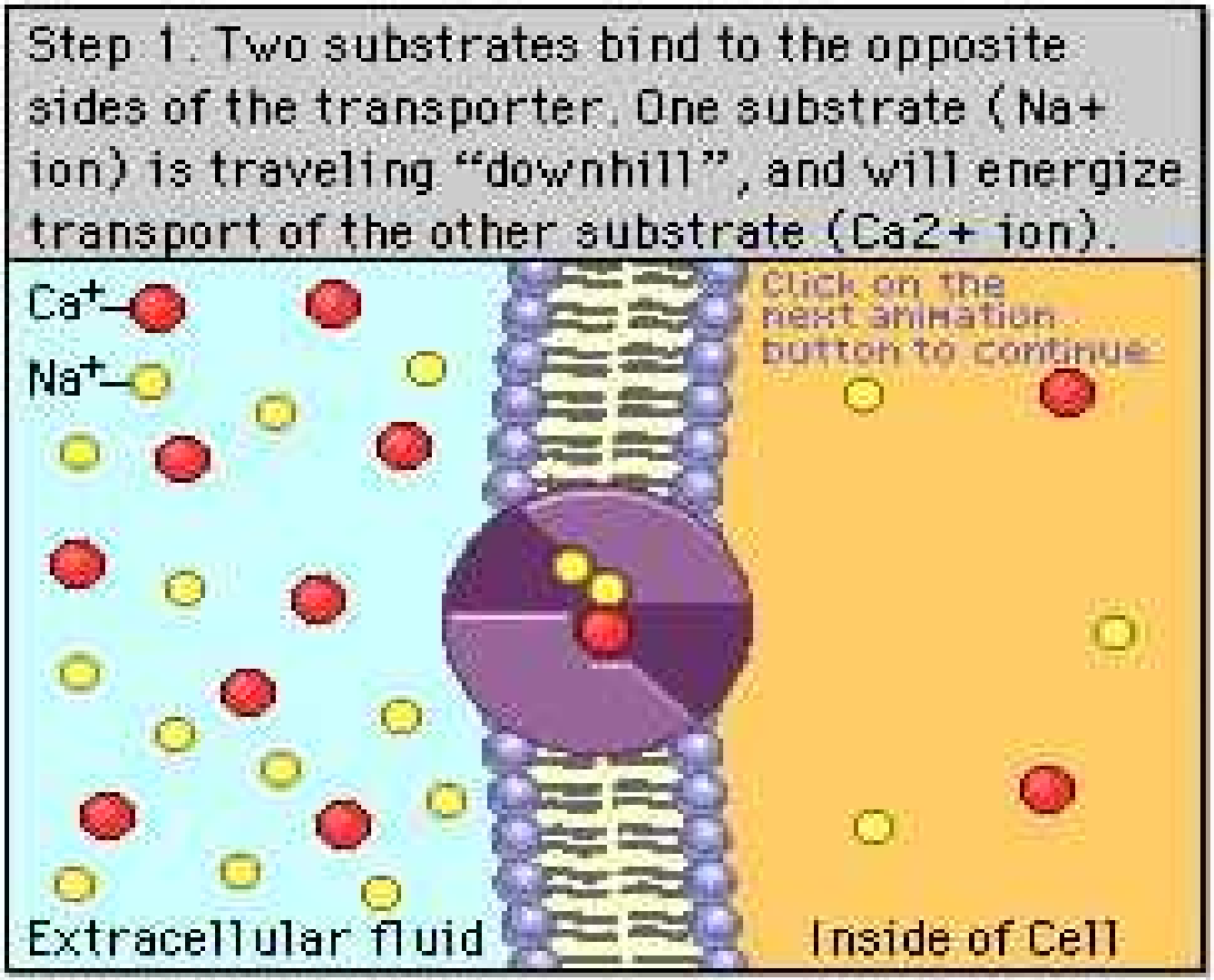
An antiport is an integral membrane transport protein that simultaneously transports two different molecules, in opposite directions, across the membrane.

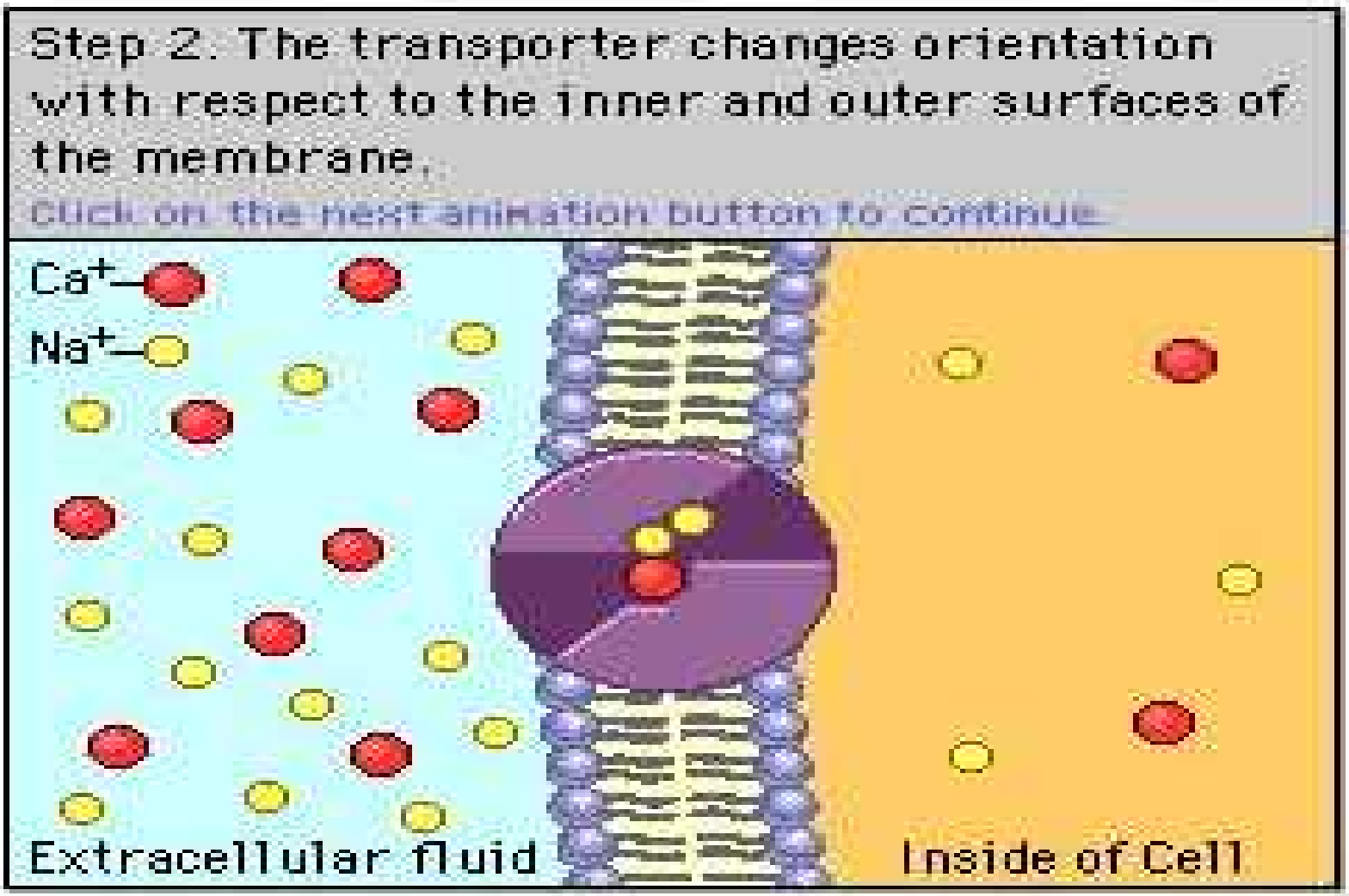
Antiport system does not uses the energy from ATP directly rather it uses the energy of an electro-chemical gradient (created by a sodium potassium pump) to move other particles against their gradient.

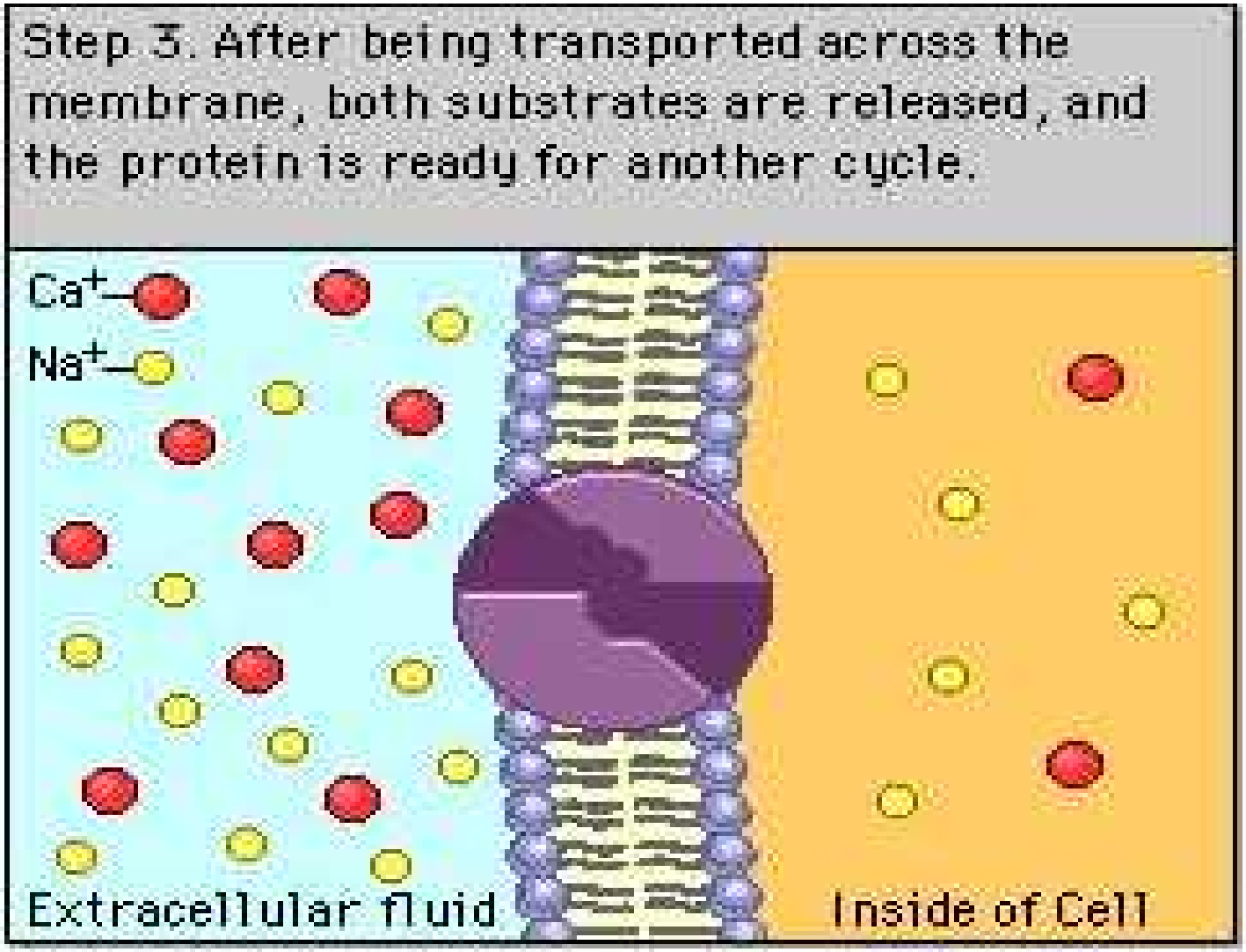
An example of an antiport process is the transport of Ca^{2+} ions out of cardiac muscle cells.

Muscle cells are triggered to contract by a rise in intracellular Ca^{2+} concentration, so it is imperative that Ca^{2+} be removed from the cytoplasm so that the muscle can relax before contracting again.

This antiport system is so effective that it can maintain the cellular concentration of Ca^{2+} at levels 10,000 times lower than the external concentration.


Step 1. Two substrates bind to the opposite sides of the transporter. One substrate (Na+ ion) is traveling "downhill", and will energize transport of the other substrate (Ca2+ ion).
Ca+
Na+
Click on the next animation button to continue.
Extracellular fluid
Inside of Cell


Step 2. The transporter changes orientation with respect to the inner and outer surfaces of the membrane.
Click on the next animation button to continue.
Ca+
Na+
Extracellular fluid
Inside of Cell


Step 3. After being transported across the membrane, both substrates are released, and the protein is ready for another cycle.
Ca+
Na+
Extracellular fluid
Inside of Cell