Active Transport

As previously discussed, molecules are in constant motion and tend to move along a concentration gradient until an equilibrium is established. In some cases however, molecules are required to move in the opposite direction due to the needs of the organism.

1. What is easier: riding a sled downhill or pulling the sled up the hill? Why?

Riding downhill is easier because it requires no energy.

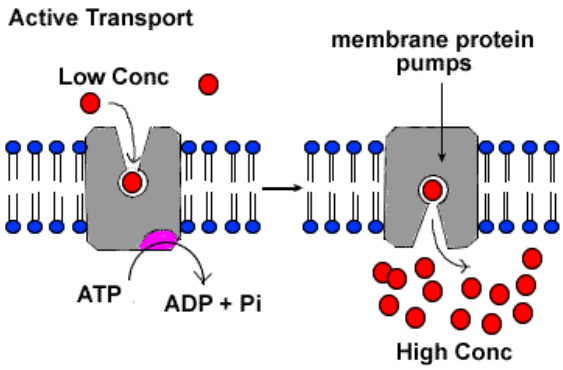
Like the sledding example, when molecules move along their concentration gradient it is a natural, passive process; no energy (ATP) is required (sledding downhill). However, when molecules move against this gradient (pulling the sled uphill), energy is required (ATP) and this is considered an active process.

2. Based on this information, what is **active transport**?

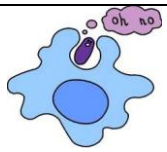
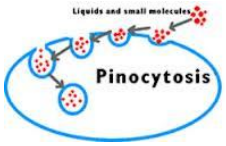
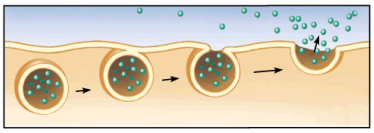
Active transport is the movement of molecules against their concentration gradient (from low to high concentration) using energy in the form of ATP.

3. When is active transport necessary and how does it occur?

Active transport is needed when a cell/organism needs to maintain a high or low concentration of a substance inside or outside of the cell. Active transport occurs via a carrier protein.



3. What are some other types of active transport? As you watch the clip, provide a description of the process and draw a diagram illustrating each type of active transport.

Type of Active Transport	Description	Illustration
Phagocytosis	The cell membrane moves to surround and to take in a solid particle	
Pinocytosis	The cell membrane pinches in to take in a liquid	
Exocytosis (opposite of above two)	A substance contained in a vesicle moves to the cell membrane and is released	

Now that we have examined the two main types of transport, let's compare the two to sum it all up!

Passive Transport vs. Active Transport

	Passive	Active
Uses ATP	NO	YES
How molecules move	High to Low	Low to High
Part(s) of cell membrane involved	Lipid bilayer (diffusion) and protein channel (facilitated diffusion)	Carrier protein
Types of molecules that move by this type of transport	Small molecules such as oxygen, carbon dioxide, water, glucose (facilitated)	Ions such as sodium (Na+) and potassium (K+)