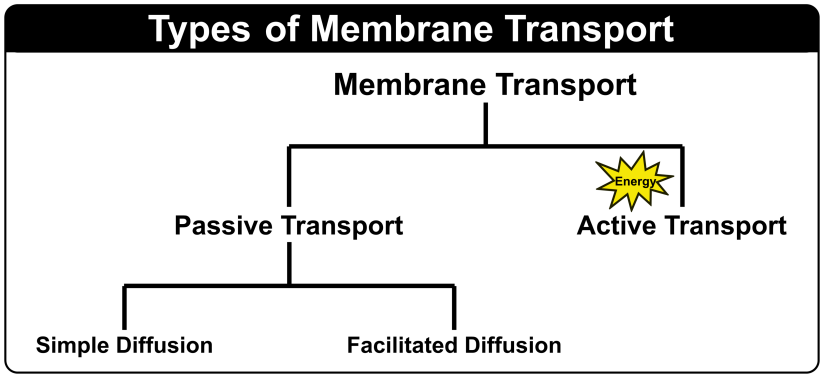
CONCEPT: MEMBRANE TRANSPORT

Intro to Membrane Transport

- To perform its functions, a cell continuously needs to exchange substances with the extracellular fluids.
    - □ Membrane transport allows cells to take in essential substances and _____ waste products.
- Membrane transport mechanisms can be broadly categorized into _____ types.
    - **1) Passive Transport:** does not require energy, substances move _____ the concentration gradient.
    - **2) Active Transport:** requires energy, substances move _____ the concentration gradient.



- **Concentration Gradient:** difference in concentration of a substance over a distance.

EXAMPLE: In the electron transport chain, complexes I, III, and IV pump H^+ ions from the mitochondrial matrix (low $[H^+]$) to intermembrane space (high $[H^+]$). Which type of membrane transport is this?

a) Active transport

b) Passive transport

c) It is not membrane transport.

PRACTICE: During respiration, oxygen gas diffuses into cells *spontaneously*. Which type of transport is this?

a) Active transport

b) Passive transport

c) Both

d) None of these

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Membrane Transport Mechanisms

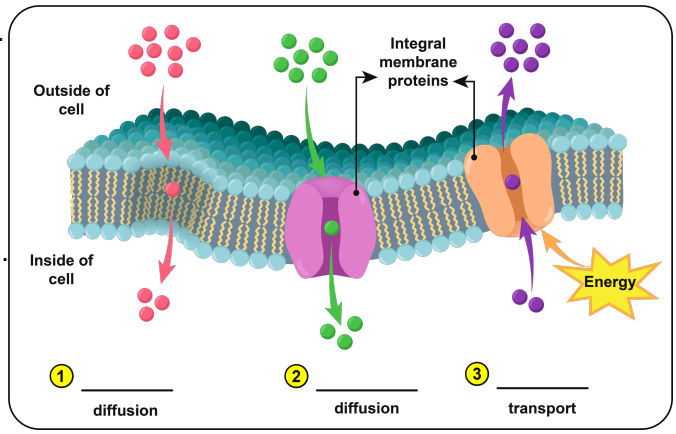
● Nonpolar molecules, polar molecules, and ions move across the cell membranes differently.

①**Simple Diffusion:** movement driven by concentration gradient.

- □ Small, _____ molecules, and _____.
- □ **Examples:** O_2, CO_2, steroids.

②**Facilitated Diffusion:** gradient driven, through protein channel.

- □ Polar molecules and _____.
- □ **Examples:** glucose, H_2O, Cl^-, HCO_3^-.



③**Active Transport:** protein channels (or _____) use energy to move substances against a concentration gradient.

- □ Highly selective and regulated, different pumps for different substances.
- □ **Examples:** Na^+/K^+ pump moves Na^+ out and K^+ inside the cell.

EXAMPLE: How would a molecule of stearic acid cross the cell membrane?

a) Simple diffusion

b) Facilitated diffusion

c) Active transport

d) None of these.

PRACTICE: How would you expect an H^+ ion to move out of the cell if $[H^+]$ inside the cell is lower than extracellular fluid?

a) Simple diffusion

b) Facilitated diffusion

c) Active transport

d) None of these

PRACTICE: In oxidative phosphorylation, H^+ ions from the intermembrane space of mitochondria to the mitochondrial matrix, which type of membrane transport is this?

a) Simple diffusion

b) Facilitated diffusion

c) Active transport

d) None of these