Functional Examples of Passive Membrane Transport

Simple Diffusion: Emphysema

How are $O_2$ and $CO_2$ transported across a membrane?

What problem does emphysema create for gas exchange?
Facilitated Diffusion: Insulin-dependent glucose transporters (GLUT4)

What happens to this process in a person with untreated diabetes mellitus?

Passive transport is always potentially bidirectional for the substance being transported. How is the escape of glucose back out of the cell prevented?

Ligand-gated Channels

Natural vs. Agonist vs. Antagonist actions
Referring back to the facilitated diffusion example, how will the increase in blood glucose concentration affect water movement? What symptoms would you expect as a result?

Application of Osmosis to a Red Blood Cell

Clinical Application: Hypothalamic Osmoreceptors

Osmoreceptors in the hypothalamus are the primary trigger of the sense of thirst. How do you think they work?
Cardiovascular example of Water Movement

\( P_{\text{cap}} : \)

\( P_{\text{IF}} : \)

\( \Pi_{\text{cap}} : \)

\( \Pi_{\text{IF}} : \)

Propose a situation that could change...

\( P_{\text{cap}} : \)

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Example of Secondary Active Transport: Glucose-Sodium Cotransporter (SGLT1)

In the nephron, SGLT1 transporters are found ONLY in the proximal convoluted tubule and are responsible for returning glucose that was filtered into the nephron back to the bloodstream. How would this process be affected by untreated diabetes mellitus?

Clinical Application of multiple transport mechanisms: Cystic Fibrosis