

The Cell Membrane Transportation

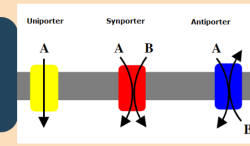
Transport Signaling

Plasma Membrane

It separates the living from the dead and keeps the living alive.

Classifications

by Direction



by Charge: voltage dependent or not

by Action: passive or active transportation

by Mechanism: channels or protein transporters

Types

Simple Diffusion

Only small, polar, uncharged molecules pass through.

They follow a gradient

Channels

Selection by size (Na^+) or by solvation layer (K^+)

Opening signals: voltage, ligands, light, temperature and pressure

Transporters

Dependent on specific binding sites (allow both directions)

ATPases: $\text{ATP} \rightarrow$ ions against the gradient

Ions in favour of the gradient $\rightarrow$ ATP

Na^+/K^+ ATPase, $\text{Na}^+/\text{glucose}$ transporter, Ca^+ pump, $\text{Na}^+/\text{Ca}^{2+}$ Transporter, ABC Transporter, Lactose permease, GLUT

Responses

proliferation, apoptosis, metabolic change, mechanical response

Types of signals

Neurotransmitters and Peptide Hormones, Steroid Hormones, Thyroid Hormones, Retinoic Acid and Vitamin D

Types of Receptors

Internal receptors

Cytoplasmic and Nuclear

Metabolism and gene expression

binding site, DNA-binding domain, regulatory domains

External receptors

Ion Channels

Catalytic membrane receptors

G protein-coupled receptors

Channel activation, cAMP synthesis, Signal shutdown

2nd messenger amplifies signal:

cAMP, Inositol phosphate and Diacylglycerol, Arrestin

Signal amplification overexaggeration:

Adrenaline cascade and kinase cascade

Tyrosine kinase receptors

Autokinase capacity (phosphorylates itself)

Linked to kinase cascades

RAS and SOS factors involved... MAPK Cascade and Insulin Receptor Cascade

Signal shutdown: removing phosphates from kinases or removing membrane receptors once activated

