

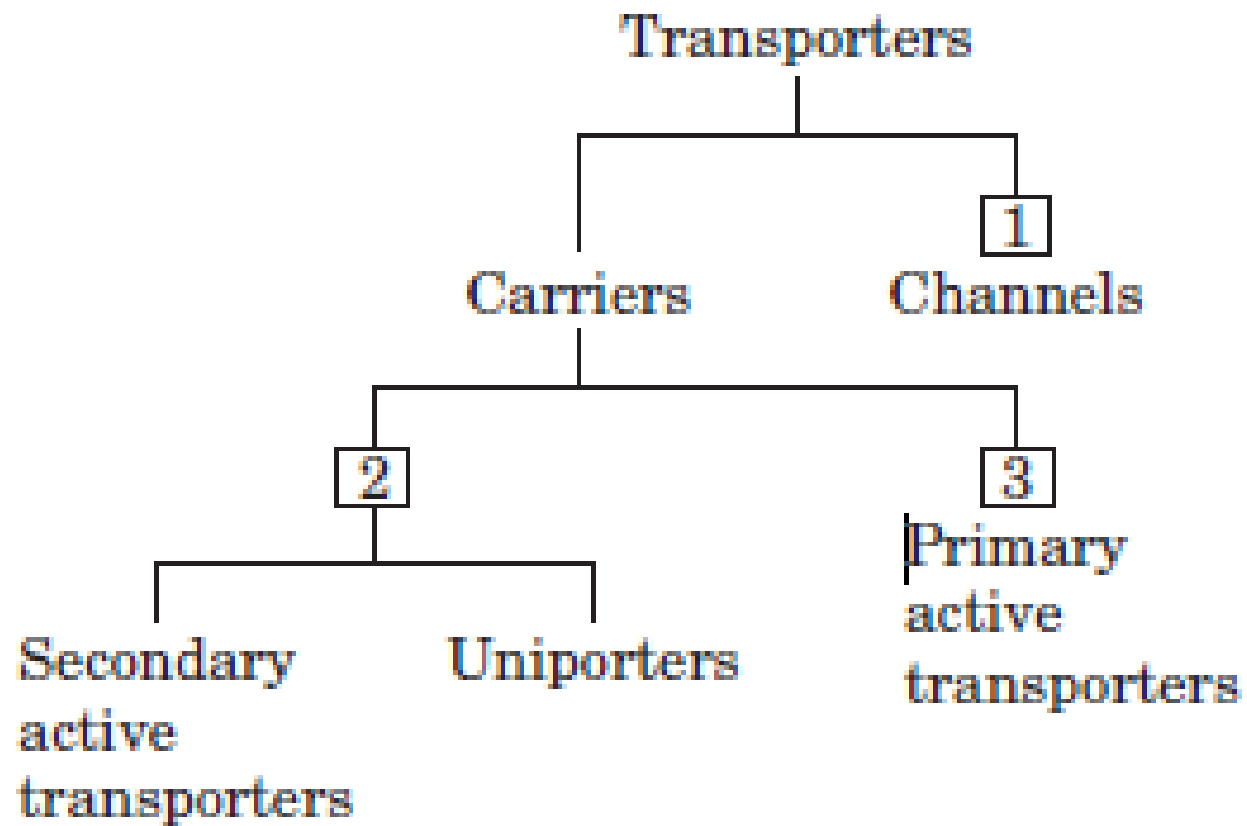
# **Transport proteins**

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# Transport proteins

- For the majority of substances a cell needs for metabolism to cross the cytoplasmic membrane, specific **transport proteins (transporters)** are required.
- This is because the conc. of nutrients in most natural environments is typically quite low.
- Transport proteins allow cells to accumulate nutrients from even a space environment.
- Transporters can be divided into two broad categories:
  - Channels
  - Carriers
- Channels are oligomeric complexes of several, often identical subunits. Eg. Porins
  - Channels can be of  $\alpha$ -helix type or  $\beta$ -barrel type.
  - Channels generally allow transmembrane movement at rates several orders of magnitude greater than those typical of carriers, rates approaching the limit of unhindered diffusion.
  - Channels typically show less stereospecificity than carriers and are usually not saturable.



# ... Transport proteins

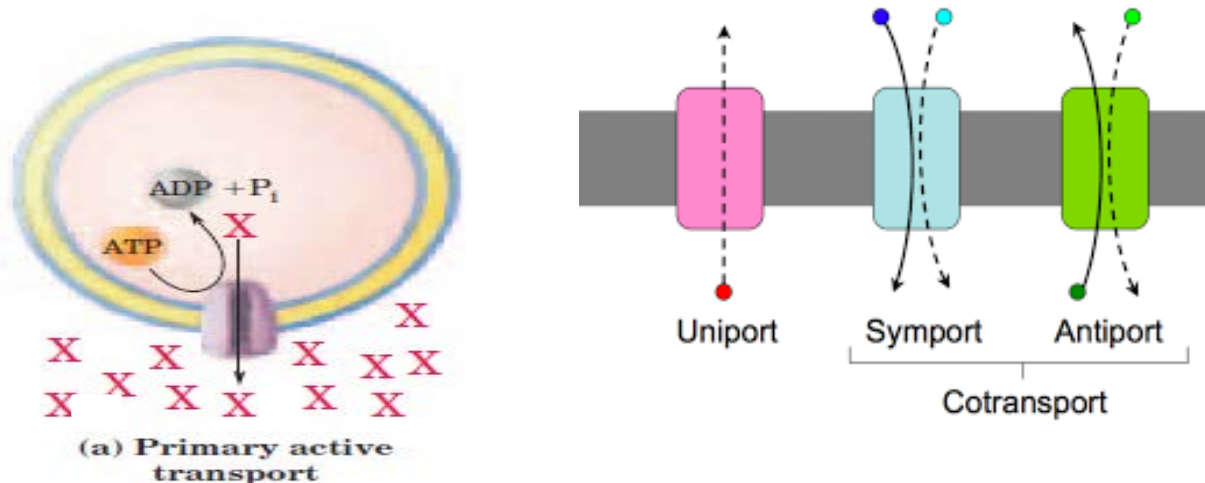
- **Carriers** are highly stereospecific monomeric proteins.
- catalyze transport at rates well below the limits of free diffusion, and are saturable in the same sense as are enzymes: there is some substrate concentration above which further increases will not produce a greater rate of activity.

## Carrier protein types:

- Among the carriers, some simply facilitate diffusion down a concentration gradient; they are the **uniporter superfamily**.
  - **Uniporters:** are proteins that transport a substance from one side of the membrane to the other.
- Others (active transporters) can drive substrates across the membrane against a concentration gradient, some using energy provided directly by a chemical reaction (primary active transporters).

# ...Carrier proteins types

- And some coupling uphill transport of one substrate with the downhill transport of another (secondary active transporters-**Cotransporters**).
  - **Cotransporters**: transport molecules of interest across the membrane along with a second substance required for transport of the first
    - **Symporters**: both transported in same direction. Symporters use the potential energy of electrochemical gradients from protons, that is, proton motive force to co-transport ions, glucose etc. against their conc. gradient.
    - **Antiporters**: two substance transported in opposite direction



# Questions

- Why are transport proteins necessary?
- Write a short note on transport proteins.