

III. TRANSPORT ACROSS MEMBRANES

A) PASSIVE DIFFUSION

- 1) O₂, CO₂
- 2) small polar molecules like ethanol

B) SOME MOLECULES DO NOT DIFFUSE FREELY

1) most water soluble molecules

- a) glucose
- b) nucleosides
- c) amino acids

2) ions

- a) hydrogen
- b) sodium, potassium
- c) calcium

3) large charged molecules

C) CARRIER PROTEINS VS CHANNELS

D) PASSIVE TRANSPORT (FACILITATED DIFFUSION) Vs ACTIVE TRANSPORT

E) SOME TYPES OF CARRIER PROTEINS

1) Na⁺/K⁺ pump (Na⁺/K⁺ ATPase)

- a) uses energy derived from ATP hydrolysis

- b) requires an ATP driven conformational change
- c) 3 Na⁺s are pumped out 2 K⁺s pumped in
- d) establish a gradient across the cell

2) Ca pumps

- a) structurally similar to Na/K pumps
- c) pumps Ca⁺ out of the cell
- d) This makes the cell sensitive to small levels of Ca⁺
- d) important in signaling

3) H⁺ pumps

- a) H⁺ is pumped out of cells lining the stomach (ATP driven)
- b) H⁺ pumps on lysosomes and endosomes (ATP driven)
- c) H⁺ pump found on mitochondria and chloroplasts
 - not ATP driven

4) ABC transporters

- a) MDR
- b) CFTR

5) glucose transporters

- a) Na⁺/glucose symporter
- b) glucose transporter - uniport

6) Na⁺/Ca²⁺ antiporter

7) Na-H exchange protein

F) CHANNEL PROTEINS

1) some characteristics of ion channels

- a) allow transport of ions down their electrochemical gradient
- b) transport through ions channels is very rapid
- c) ion channels are selective
- d) ion channels are not necessarily permanently open
 - i) ligand gated channels
 - ii) voltage gated channels
- e) can be used for coupling to more unfavorable reactions