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PHYSIOLOGY

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Price :

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FAST REVIEW`

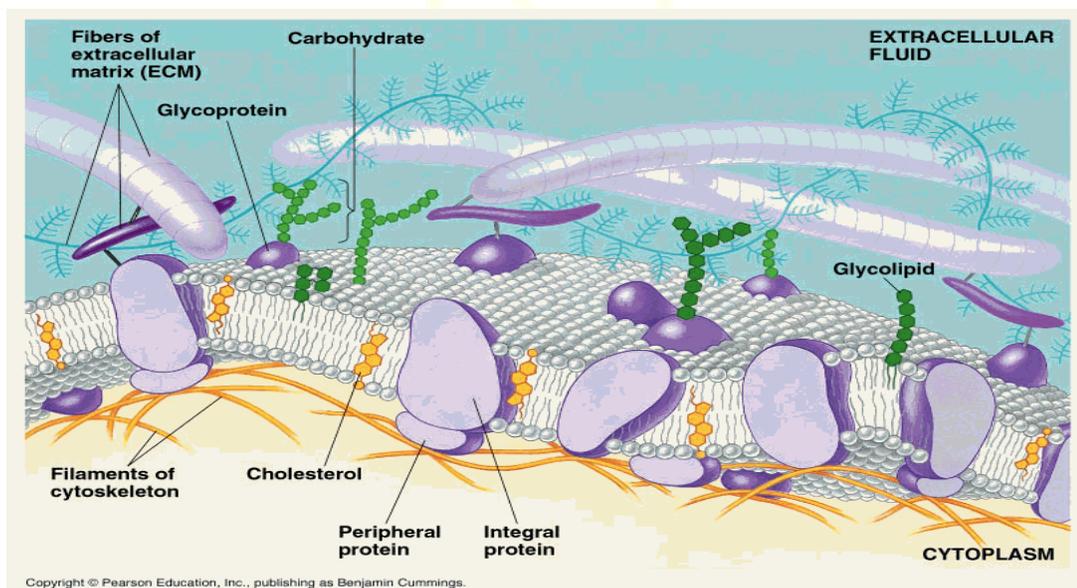
Normal mechanism : negative feedback mechanism

e.g : controlling the blood pressure is an example of negative feedback mechanism

internal environment = interstitial fluid

Cell membrane

- * The exchange between the cell and the fluid occur through the cell membrane
- *The cell membrane separates the extracellular fluid from the intracellular fluid
- *Cell membrane is dynamic (not static)
- *And its work according to the fluid – mosaic model



The cell membrane consist of :

1- Phospholipid bilayer:

Why “bilayer” ?

Because it consists of two layer of phospholipids , and each one consists of a hydrophilic head and a hydrophobic tail.

As the cell membrane is surrounded by fluids , the hydrophilic heads are arranged to face fluids .

*phospholipids is the major part of the cell membrane.

2- Proteins :

There are two kinds of proteins in the cell membrane : integral proteins and peripheral proteins.

a- Integral (structural) proteins :

*Functions :

1. Transportation .

-Integral proteins can transport molecules and ions through the membrane, facilitated or active transport are two such transport functions.

-The protein can also act as ion **channels** which help the cells to transport substances along the cell membrane (these channels are specific), and these channels can be opened and closed.

2. The protein can also act as **receptors** for different hormones or neural signals.

3. The integral proteins can be found attached to **cytoskeleton**.

4. They work as enzymes ; for example some of integral proteins digest disaccharides (like : maltose , sucrose, lactose).

(transport – enzyme – receptor - ..)

*they have more functions .

b- Peripheral (surface) proteins :

*Function :

- its important for cell identity (antigenic) >> important for transplanting of tissues , blood,..etc.

- they can form enzymes , also to digest disaccharides .

Peripheral proteins are fond on the both sides of the cell membrane.

3- Carbohydrates :

a- Glycolipids

b- Glycoproteins:

*They are antigenic

*Functions :

- blood grouping (ABO) , all groups have antigens except “ O “ has no antigens.

- cell identity.

There are two kinds of transportation :

1- Passive transport :

-Down-hill the concentration gradient .

-NO energy is needed.

There are also two kinds of passive diffusion :

a- Simple diffusion : without the usage of proteins (through membrane)

Substances that do this kind of transport have to be (**lipid soluble** substances).

Such as : O₂,CO₂ H₂O,N₂, NH₃, steroids ,...etc .

*sometimes simple diffusion occurs through channel proteins.

b- Facilitated diffusion (carrier mediated diffusion) : here the body use channel and carrier proteins (without energy: under the gradient concentration).

- NOTE : Both channel and carrier proteins are specific.

2- Active transport :

-up-hill the concentration gradient.

-NEEDS energy (ATP)

-Pumps are active transporter e.g. Na-K pump , H pumps ...etc.

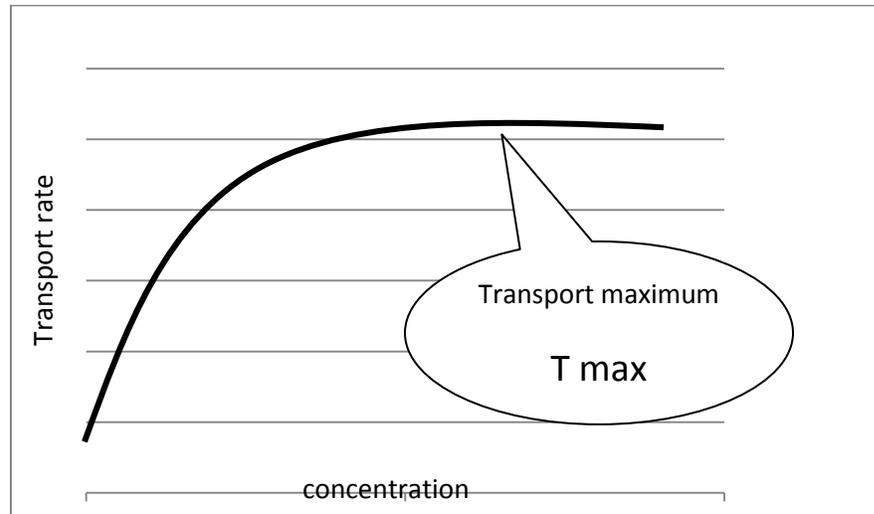
There are two kinds of active transport :

1. Primary active transport : they use energy **DIRECTLY** >> pump is ATPase enzyme.
2. Cotransport : they use energy **INDIRECTLY** >> two substances move together , energy is spend to build up a gradient so both substances can move along each other , and the other substance will be transported actively , e.g. glucose-H pump where H⁺ gradient was built by ATP then H⁺ will move passively along with glucose (but glucose actively) .
3. Phagocytoses : for solids (energy to form pseudopodia) .
4. Pinocytoses : for fluids

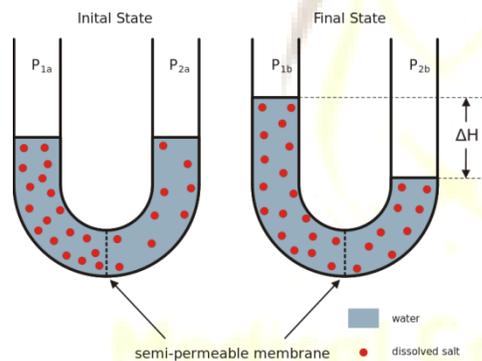
Saturation of the transport mechanism (for facilitated diffusion) :

*When the all the binding sites of carrier proteins are occupied with substances.

*The greater the concentration gradient , the greater amount will be transported .



Osmosis :



- The net movement of solvent molecules through a partially permeable membrane into a region of higher solute concentration, in order to equalize the solute concentrations on the two sides.
- **Osmolality** : the concentration of a solution in terms of osmoles of solute per kilogram of solvent.

e.g : If we have 140 mM of NaCl, calculate the osmolality.

NaCl dissolve as ions :

Na^+ and Cl^-

So : we are going to have (fully ionized)

140 mM Na^+ }
 140 mM Cl^- }

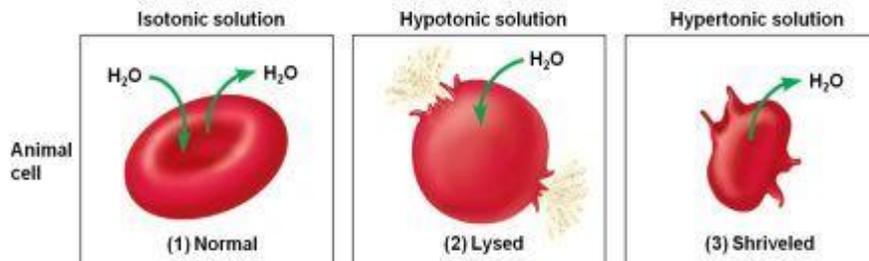
So the osmolality = 280 osmo. /kg

e.g : If we have 100 mM of glucose, calculate the osmolality.
 Glucose dissolve as a one mass (not dissociated)
 So we have only 100 mM => osmolality=100 osmo. /kg

e.g : If we have 100 mM of CaCl_2 , calculate the osmolality.
 CaCl_2 dissolve as ions :
 Then we will have :
 100 mM Ca^{2+}
 200 mM Cl^- (=100 x #of Cl atoms in the compound) }
 So the osmolality = 300 osmo. /kg

- The osmolality in our bodies is caused by (Na^+ and Cl^-) .
- The normal osmolality is equal to 300 millosmo. /kg

*water will move from lower osmolality to higher osmolality and pressure will start to build up until osmotic pressure is reached this prevents the movement of water .



نحن في حاجة ملحة إلى المتخصصين في كل فرع من فروع المعارف الإنسانية، أولئك الذين يتخذون من معاملهم ومكاتبهم صوامع وأديرة ..! ويهبون حياتهم للفرع الذي تخصصوا فيه، لا بشعور التضحية فحسب، بل بشعور اللذة كذلك ..! شعور العابد الذي يهب روحه لإلهه وهو فرحان...!