<u>Fluid exchange between the ICF and ECF compartments</u>

Composition of fluid between these compartments is mainly determined by the **osmotic effect of the smaller solutes** (e.g. sodium and chloride) since the cell membrane is relatively impermeable to these solutes but very permeable to water.

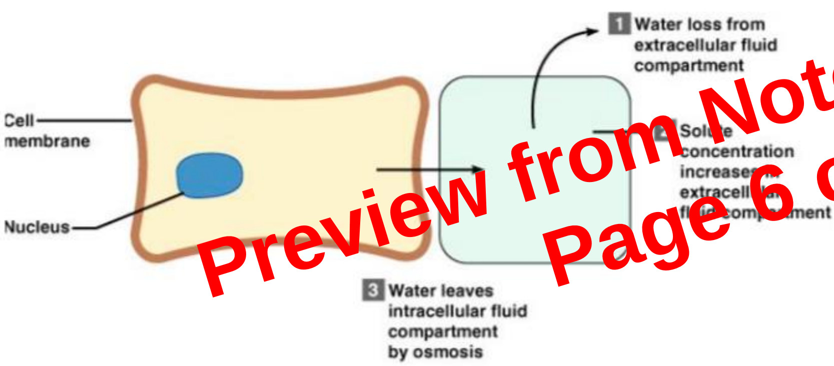
Water can move across the cell membrane to establish an osmotic equilibrium if the concentration of solutes is different on either side of the cell membrane. If a **local imbalance** does occur, osmosis usually restores the balance within seconds.

The **osmolarity** of body fluids is 280 to 295 mOsm/L of water. In clinical situations, information about body fluid osmolarity would be gleaned via a **blood test**.

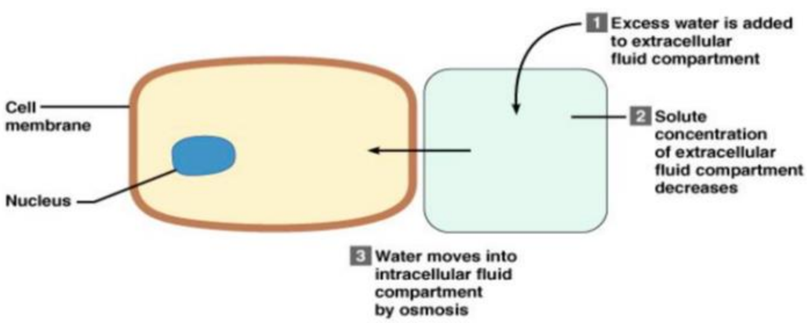
If the osmolarity of ECF or ICF deviates from normal values this would create an **osmotic gradient** for water to move across the semi-permeable cell membrane. The **ability of an extracellular solution to affect cell volume** in this way is called its tonicity.

Tonicity = biological term relating to the **actual effect of a solution on living cells** (especially RBCs). It depends on both the **osmolarity** of a solution and the ease with which the solute in question can pass through the cell membrane.

It is essential that the body regulates its fluid tonicity because;



If the ECF is hypertonic (**osmolarity is higher**) compared to the ICF of the cell, **water will move out of the cell** causing crenation (cell will shrink) causing the cell to lose its structure and so have a detrimental effect on its function.



If the ECF is hypotonic (**osmolarity is lower**) compared to the ICF of the cell, **water will move into the cell** causing cell lysis (cell will burst) impacting cell structure and function.

Therefore, the ECF and ICF have to have the **same osmolarity** (isotonic) – there will be no change in cellular volume, structure and function.