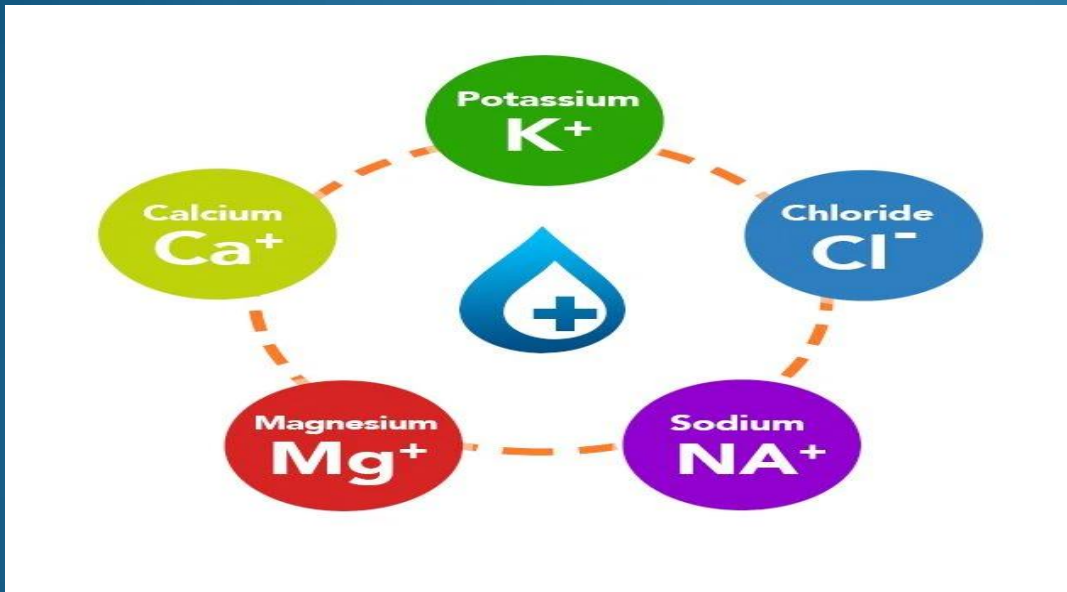
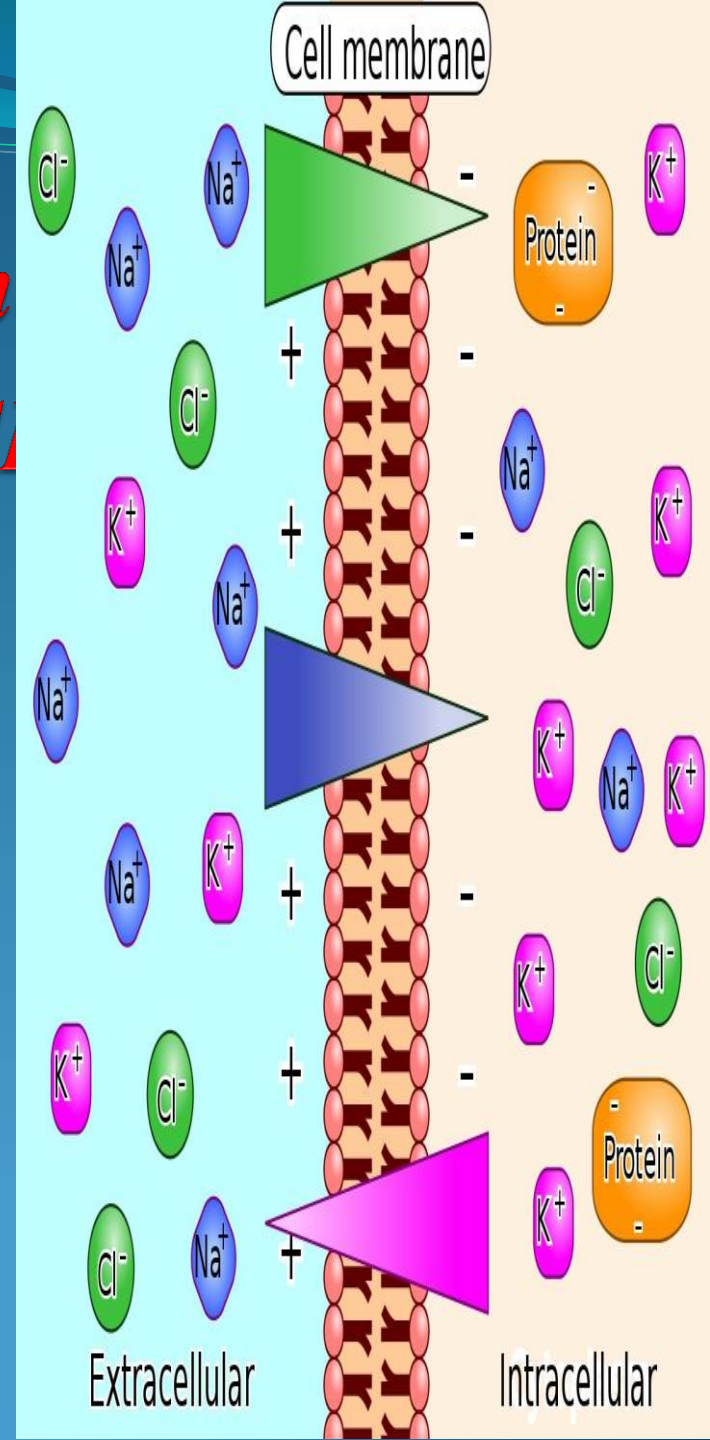


FLUID, BALANCE and DISTURBANCE



M. Sc. Alaa Hamza Hermis



Body fluids

- ❑ 60% of adult's weight (45-55%) in elderly
- ❑ Fluid refers to water and electrolytes
- ❑ Factors influencing the amount of body fluid are:
 - Age; young > old
 - Gender; men > women men (60%): women (45-55%)
 - Body fat, thin > obese

Body fluids

- **Extracellular fluids (ECF)**
- is found outside the cells and accounts for about one third (1/3) of total body fluid.
- ❖ Interstitial fluid fills the spaces between most cells of the body (2/3 of total fluid)
- ❖ Intravascular fluid plasma (1/3 of total fluid)
- ❖ 20%
- **Transcellular fluid** in body space eg. CSF, synovial, and pleural)

Body fluids

- **Intracellular fluids (ICF)**
- is found within the cells of the body. It constitutes approximately two thirds ($2/3$) of the total body fluid in adults.
 - ❖ Liquids within cell membranes
 - ❖ 40% of body weight

Fluid Equilibrium

- Fluids move between compartment to maintain homeostasis
- Movement depends on the pressure changes
- Movement of fluids through capillary walls depends on :
 - **Hydrostatic pressure**
Pressure exerted on the walls of blood vessels due to the presence of blood
 - **Osmotic pressure**
pressure exerted by the protein in the plasma
- Direction of fluid movement depends on the differences of hydrostatic and osmotic pressure.

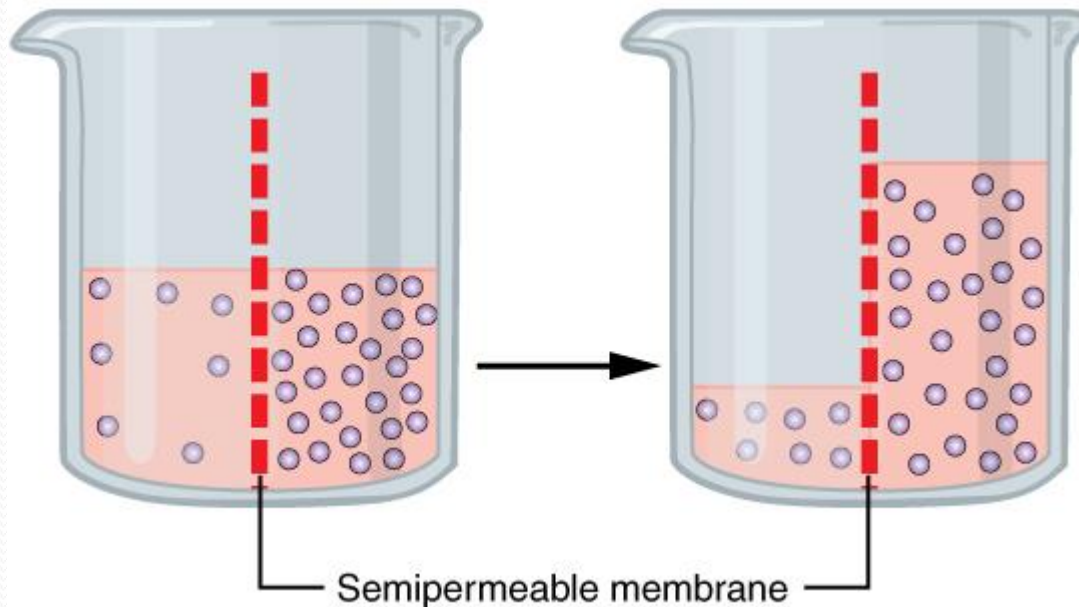
Four mechanisms work to maintain fluid equilibrium

- ❖ Osmosis
- ❖ Diffusion
- ❖ Filtration
- ❖ Active transport

Continue

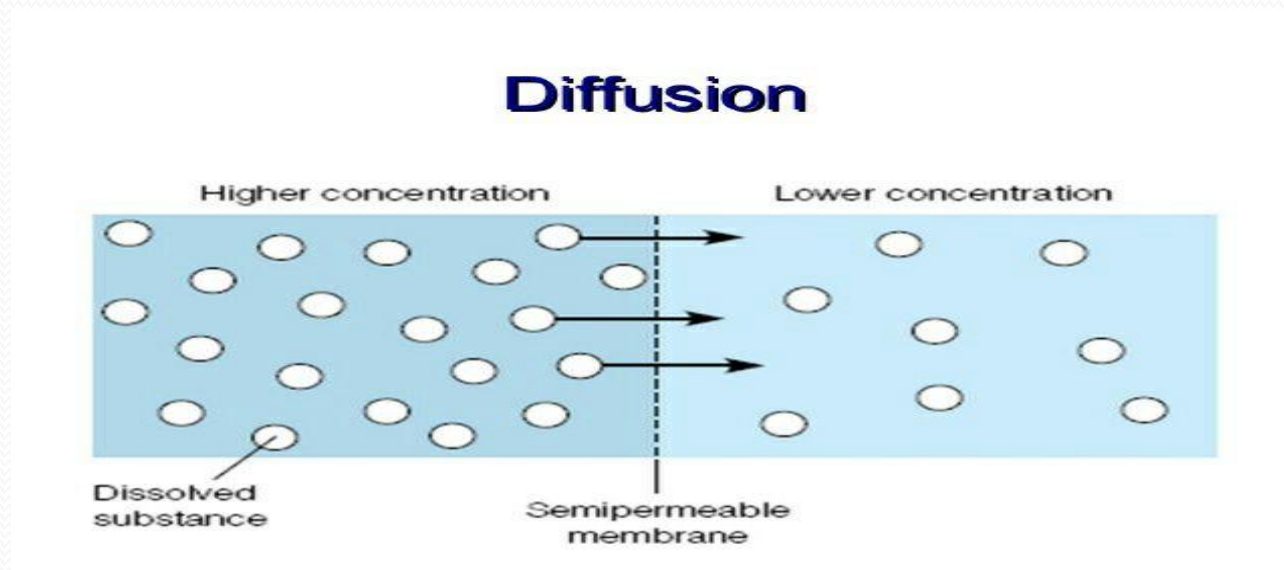
- **Osmosis**

Movement of a pure solvent, e.g. water through a semi permeable membrane from a solution that has a lower solute concentration to one that has a higher solute concentration



continue

- *Diffusion*
- Area of higher concentration to an area of lower concentration till even distribution
- By which substances such as nutrients and waste products move between blood and interstitial spaces
- Diffusion does not require energy.



Continue

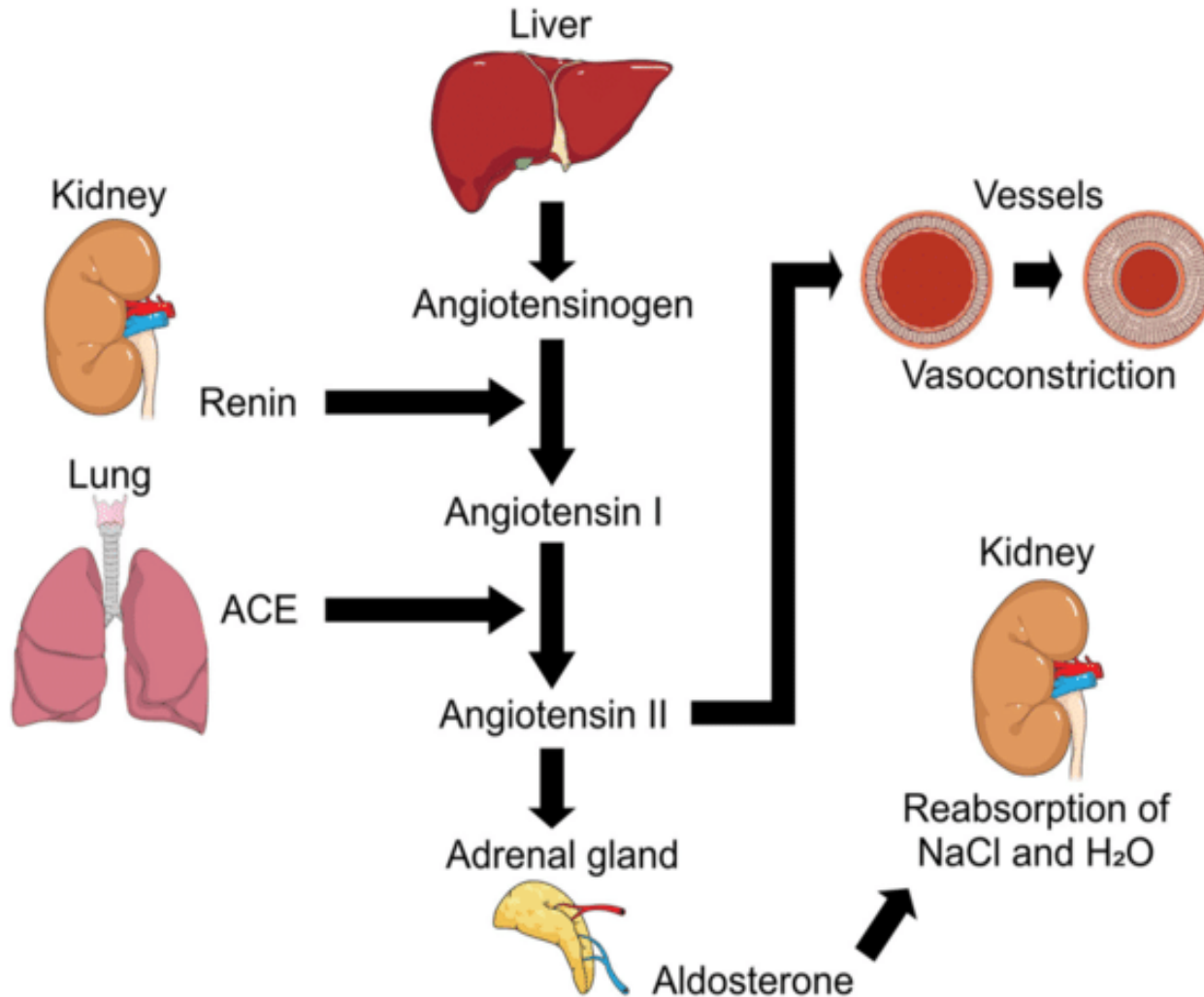
Filtration

Movement of water and solutes from an area of higher hydrostatic pressure to an area of lower hydrostatic pressure.

Fluid Regulation: Kidney

- Regulates fluid output by urine formation
- Regulates sodium and water balance
- Regulate ECF water and electrolyte by either retention of substance and excrete fluid or the opposite
- Regulate PH of the ECF by retention or excretion of H⁺ ions.

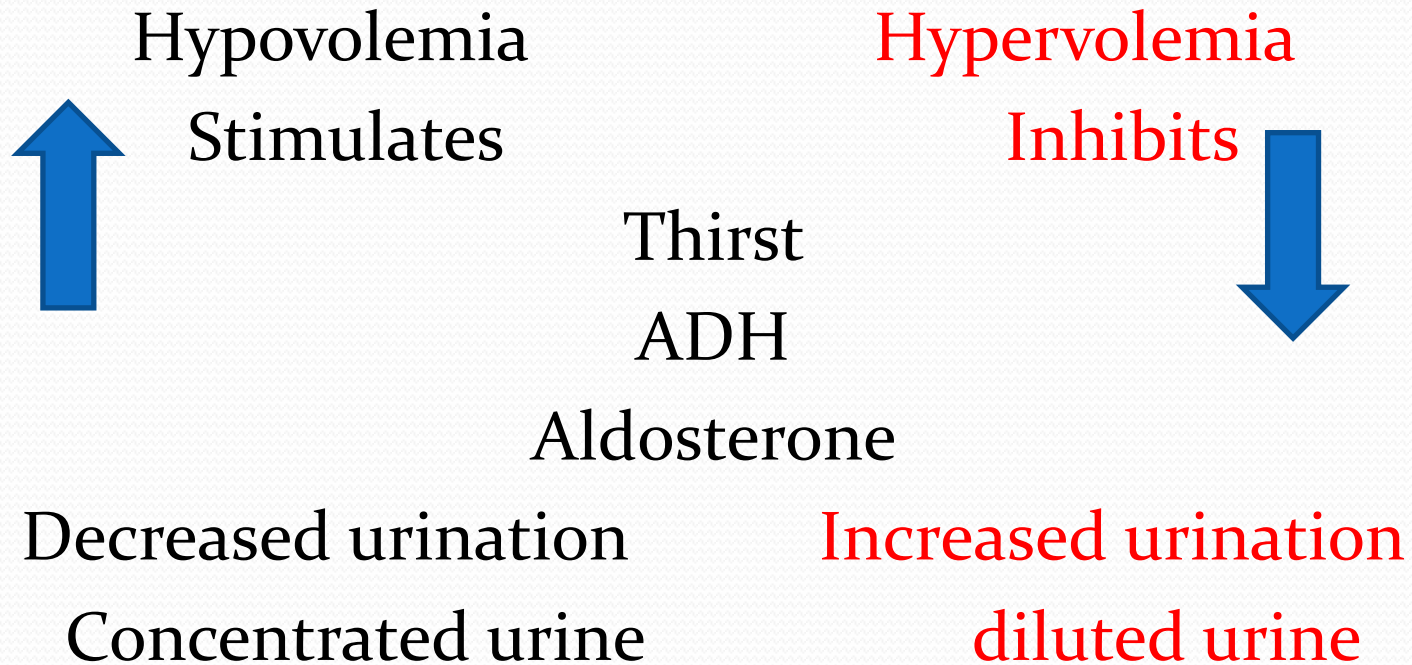
Renin-Angiotensin-Aldosterone System (RAAS)



Fluid Regulation: Endocrine

- Regulate at fluid intake by thirst mechanism
- ADH increase water reabsorption
- Aldosterone increase sodium retention
- Atrial Natriuretic peptide (ANP) (a cardiac hormone found in the atria of the heart that is released when the atria are stretched by high blood volumes or high BP) promotes sodium excretion and inhibits thirst mechanism
- Para hormone important for calcium and phosphorus balance (increase Ca level in blood)

Fluid Regulation



Average Daily Fluid Intake for an Adult

Source	Amount (mL)
Oral fluids	1,200–1,500
Water in foods	1,000
Water as by-product of food metabolism	200
Total	2,400–2,700

Electrolytes

- Active chemicals that carry positive (cations) and negative (anions) electrical charges

- *Major cations*

- Sodium
- Potassium
- Calcium
- Magnesium
- Hydrogen ions

- *Major anions*

- Chloride
- Bicarbonate
- Phosphate
- Sulfate
- Proteinate ions

Electrolytes (cont.)

- *Major cation in ECF*

Sodium

- *Major cation in ICF*

Potassium

Normal Blood Electrolytes Value

Normal Blood Electrolytes Value	
<i>Sodium</i>	135 - 145 Meq/L
<i>Potassium</i>	3.5 - 5.5 Meq/L
<i>Calcium</i>	8.5----10.5 Meq/L
<i>Magnesium</i>	1.5- 2.5 Meq/L
<i>Chloride</i>	95- 108 Meq/L



Types of intravenous fluids

Isotonic

- G/W 5% -- N/S 0.9%

Hypertonic

- G/W 10% -- saline%2

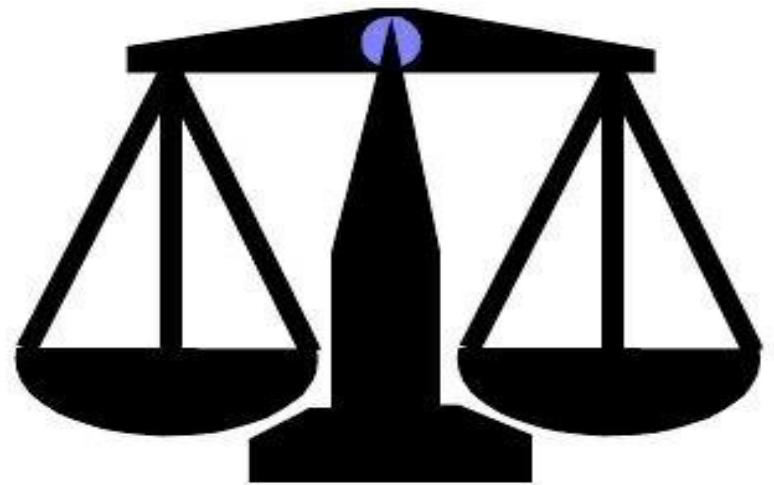
Hypotonic









- G/W 3% -- Saline 0.45%



Arterial Blood Gases (ABGs)

- s pH 7.35-7.45
- s PaCO₂ 35-45 mm Hg
- s Pa O₂ 80-100 mm Hg
- s O₂ sat. 95-99%
- s HCO₃⁻ 22-26mEq/L



ABG	pH	PaCO ₂	HCO ₃
Respiratory Acidosis			normal
Respiratory Alkalosis			normal
Metabolic Acidosis		normal	
Metabolic Alkalosis		normal	

Thank You!

