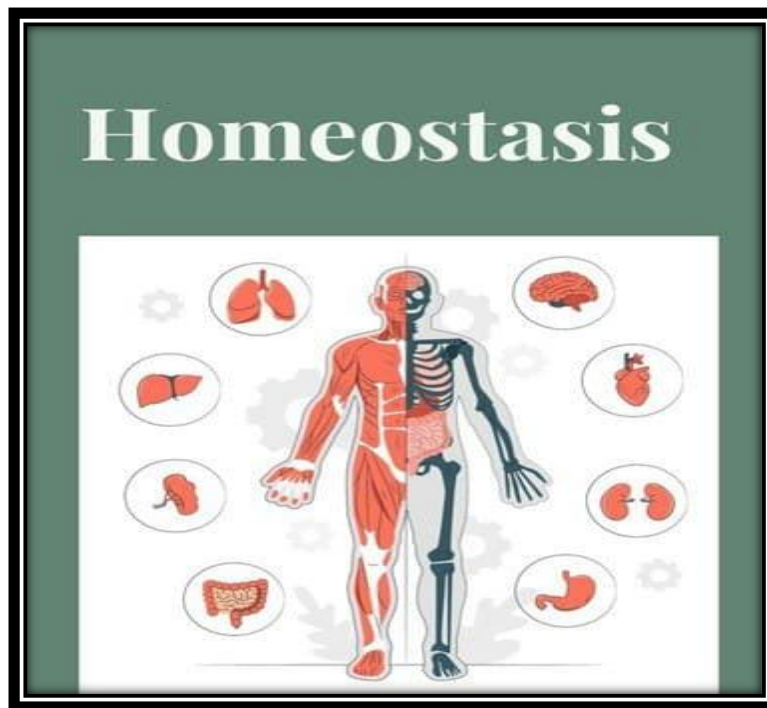




Homeostasis

Homeostasis

The ability of all organs and tissues of the body to maintain a relatively stable internal environment in an ever-changing outside world. Ex: The lungs provide oxygen to compensate the oxygen used by the cells. The kidneys maintain constant ion concentrations .



Homeostatic Imbalance

Disturbance of homeostasis (body's normal equilibrium) caused by :

1. Diseases
2. Anesthesia

Which cause :

- a. Fluid- electrolytes imbalance
- b. Acid-base disturbance
- c. Metabolic disturbance



Body Fluids

Body Fluids are divided into :

- I. The intracellular fluid (ICF) which exists inside the cells accounts for a 40% bwt) .
2. Extracellular fluid (ECF): Cells exist in it .From which, they take up O₂ and nutrients into it, they discharge Metabolic waste products

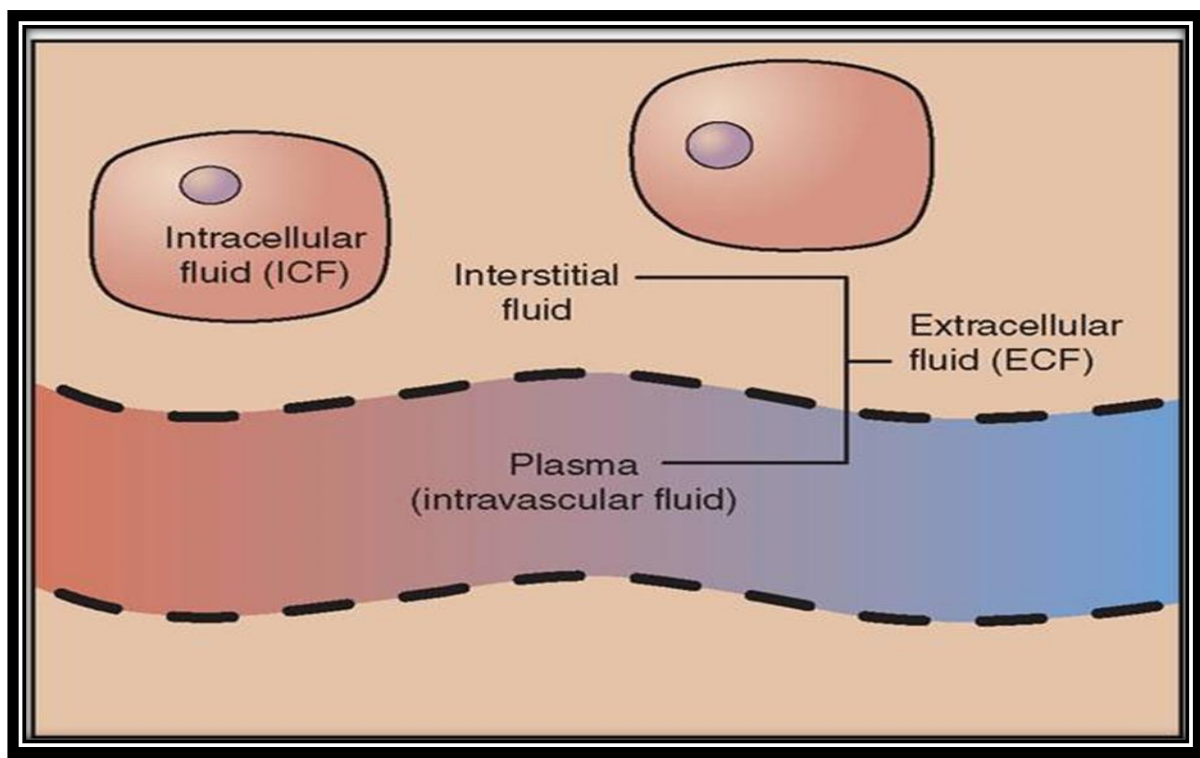
The ECF is divided into two components :

- a. The interstitial fluid (3/4) =15% bwt

The part of ECF outside the vascular system ,bathing the cells .

- b. The circulating blood plasma(1/4)=5% bwt Plasma and the cellular elements of the blood which fill the vascular system .

- 1/3 of total body water is extracellular .
- the remaining 2/3 is intracellular fluid.





Differences Between Extracellular and Intracellular Fluids

The extracellular fluid contains large amounts of

- Sodium, chloride, and bicarbonate ions
 - Nutrients for the cells, such as glucose, fatty acids, and amino acids .
 - Oxygen & Carbon dioxide gasses
 - Cellular waste products
- The intracellular fluid contains :
- Large amounts of potassium, magnesium, and phosphate ions.

Ions	ECF	ICF
Na ⁺	145 mM	10 mM
K ⁺	5 mM	135 mM
Cl ⁻	120 mM	10 mM
Proteins ⁻	0 mM	100 mM

Water balance

- Normal balance is maintained with intake and losses of 2.5—3 litres per day .
- Intake from ingested fluid (1300 ml), solid food(800) ml) and metabolic waste (400 ml).



This is balanced by insensible fluid losses of 0.5 ml kg⁻¹ h⁻¹ (850 ml) from skin and lungs; plus losses from urine (1500 ml) and faeces (100 ml)

These values are in health, normo-thermia & rest.

Sodium Balance

✓ Sodium balance is related to ECF volume and water balance .

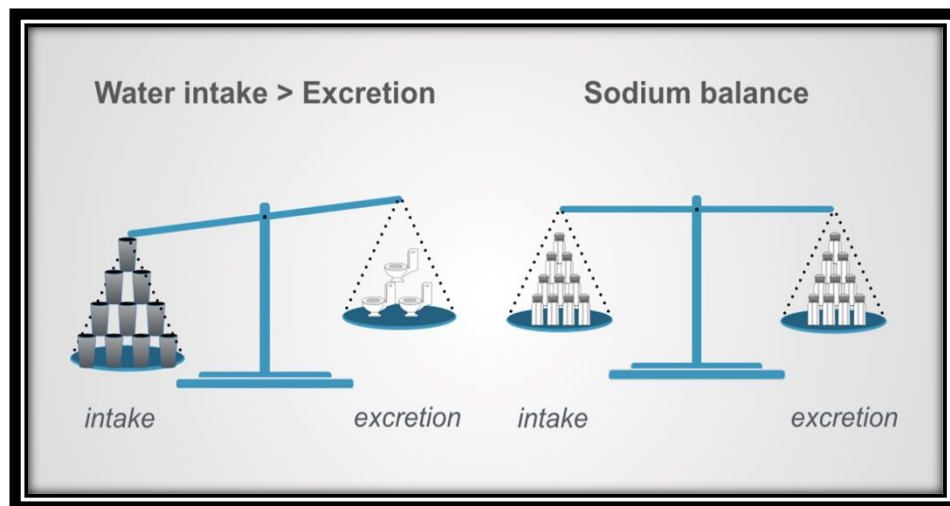
Daily ingestion has a range (50—300 mmol).

✓ It is regulated by the kidneys depending on :

a. Glomerular Filtration Rate (GFR) .

b. Sympathetic tone and Renin-Angiotensin system (Stimulation of Aldosterone secretion)

c. ADH and Aldosterone Hormones (Retention of Na⁺ & Excreting of K⁺)





Na⁺ Imbalance

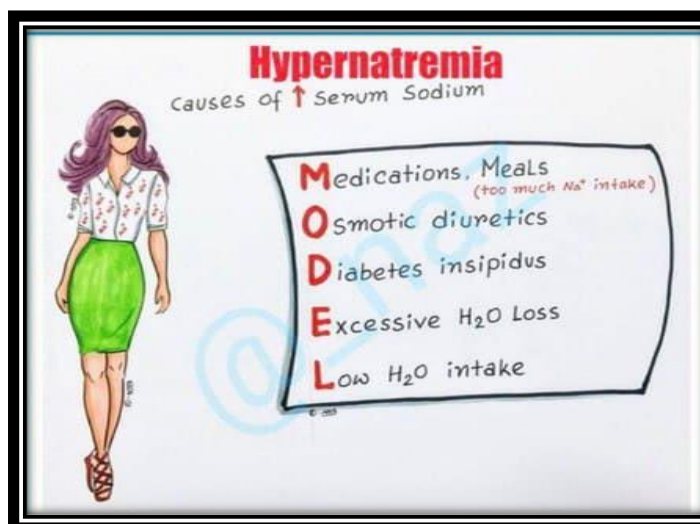
- Sodium, must be tightly regulated to avoid osmosis and cell damage.
- The renal system maintains ECF volume by regulating sodium and osmotic concentration by retaining or excreting water.
- Measurement of urine and plasma osmolalities helps in diagnosing electrolyte disturbances.
 - ❖ (Normal Plasma osmolality ranges from 280 to 295 mOmol / litre).

Hypernatraemia & Hyponatraemia

Hypernatraemia:

Leads to pyrexia (fever), nausea, vomiting, convulsions, coma and focal neurological signs.

Correction is advisable over 48—72 h with 5% dextrose.





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Hyponatraemia:

symptoms depend on the cause, magnitude and pidity. the aim of treatment is to raise plasma Na⁺ concentration to 125 mmol per litre gradually over a period of no less than 12 h while treating the underlying cause.