


Fluid & Electrolyte- I


19th May 2011



Body fluid composition


- **TBW– 60% of body weight**
 - Intracellular: 40%
 - Extracellular: 20%
 - Intravascular compartment: 5%
 - Interstitial " : 15%

TBW-- more in children, muscular person.




Fluid intake

- **2 sources**
- **Exogenous: 2-3 litres**
- **Endogenous: oxidation of ingestion food; 500ml**
- **Water requirement more in children,**
 - Large body surface area
 - Greater metabolic activity
 - Poor concentrating ability of immature kidneys



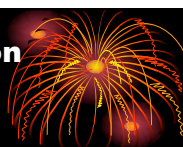
Fluid output

- **By lungs: 400ml**
- **Skin: 600-1000ml**
- **Faeces: 60-150ml**
- **Urine: 1500ml, minimum– 400ml**




Water depletion

- **Diminished intake**
 - Lack of availability
 - Difficulty/ inability: to swallow, esophageal obstruction
 - Increased loss from lung/ skin
- **CF:**
 - Weakness, intense thirst, decrease urine output



Average daily water balance

Intake	Output
Beverage: 1200ml	Urine: 1500ml
Solid food: 1000ml	Insensible loss from skin & lungs: 900ml
Oxidation: 300ml	Faeces: 100ml
Total: 2500ml	2500ml



Water intoxication

- **Excessive water/ hypotonic solutions intake**
- **Causes:**
 - 5% dextrose over-infusion
 - Colorectal washout with water
 - TURP syndrome
 - SIADH
- **CF:**
 - Drowsiness, weakness, convulsion, coma, nausea & vomiting
- **t/t: water restriction, diuretics, hypertonic saline**

Osmolality

- **Plasma osmolality: 290-310 mOsm/L**
- **Posm:**

$$= 2 \times \text{serum (Na + K mmol/L)} + \text{glucose (mg/L)} / 18 + \text{BUN (mg/L)} / 2.8$$

Sodium

- **Principle cation of ECF**
- **Total Na = 5000 mmol**
 - 44% = ECF
 - 9% = IC
 - 47% = bone
- **Serum Na: 135 – 145 mmol/L**
- **Daily intake: ~ 1 mmol/kg of NaCl**
- **Mainly lost in urine, also in faeces/sweat**

Sodium.....

- **Na excretion is under control of adrenal corticoids**
- **Aldosterone..... Absorption of Na from renal tubules**
- **After surgery/ trauma..... Variable period of Na excretion shut down, can last upto 48 hours**

Hyponatremia

1. **Isotonic hyponatremia:**
 - Hyperlipidemia, hyperproteinemic states
 - Excess transfusion of isotonic Na free solutions like glucose, mannitol, glycine.
2. **Hypertonic hyponatremia:**
 - Hyperglycemic states
 - Rapid infusion of hypertonic glucose, mannitol, glycine.

Hyponatremia

3. **Hypotonic hyponatremia:**
 - GI losses: diarrhoea, vomiting, intestinal obstruction, fistula
 - Skin losses, lung losses, 3rd space loss
 - TURP, SIADH, water intoxication
 - CHF, cirrhosis
 - Adrenocortical insufficiency

CF of hyponatremia

- **Features of dehydration:**
 - sunken eyes, dry tongue, depressed fontanelle
 - Skin dry, wrinkled
 - Scanty, high colored urine
 - Thirst
- **Severe cases: drowsy, dizziness, headache, seizure, unconsciousness, coma**