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 m*Osm*/L
- P*osm:*

  = 2 x serum (Na + K mmol/L) + glucose (mg/L)/ 18 + 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 excreation 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, unconciousness, coma**