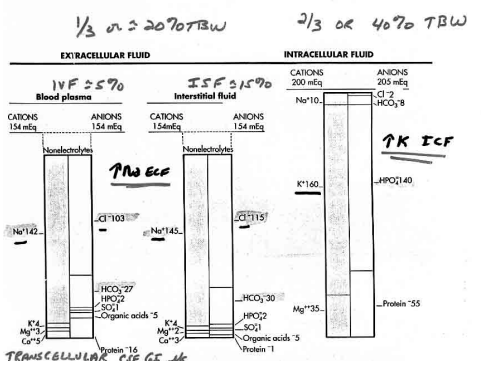
Fluid, Electrolyte, and Acid Base

Part 3 Disorders of Osmolality

Disorders of Osmolality

Hyponatremia



Sodium

- Important role in maintaining plasma volume (ECF) to insure adequate organ perfusion
- In healthy individuals, ECF volume varies with effective circulating volume
  - Proportional to total body sodium
  - Kidney mainly controls sodium levels

Hyponatremia (Hypoosmolality)

- Causes
  - Water retention
  - Sodium loss

Hyponatremia Types

- *Depletional*
  - **Causes**:salt wasting due to renal disease or diuretics
  - **Effects**: lowers Na:H_2O ratio leading to ECF contraction
- *Dilutional*
  - **Causes**: renal defects in H_2O excretion
  - **Effects:** decreased effective circulating blood volume leads to increased ADH and thirst

Hyponatremia Effects

- Effects due to water moving where?
- Mainly neurological due to increased intracranial pressure

Manifestations of Hyponatremia

- <125 mEq/L: A, taste change, muscle cramps
- 115-120 mEq/L: HA, personality change, weakness, lethargy, N, V, abdominal cramps
- <115 mEq/L: CNS signs (seizures, coma, reflexes diminished, Babinski's sign, papilledema, fingerprinting)

Causes of High ADH with Hyponatremia

- CNS disorders
- Pulmonary disorders
- Endocrine disorders
- Post-operative states
- Ectopic ADH production

Disorders of Osmolality

Hypernatremia

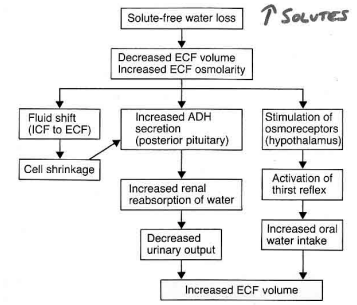
Hypernatremia

- Increased serum osmolality
- Etiology-Excess sodium over water, osmotic diuresis
- Water leaves cell for ECF-cell shrinkage
- Manifestations: dehydration signs and symptoms

Causes of Hypernatremia

- Insufficient H_2O intake
- Excess H_20 loss
  - renal: DI, osmotic diuresis
  - nonrenal: burns, fever, diaphoresis, hyperventilation, watery diarrhea, prolonged mechanical ventilation
- Sodium gain

Hypertonic Dehydration



Hypernatremia

- Clinical manifestations (>145 mEq/L):
  - signs of dehydration: hot, dry, flushed, sticky mucous membranes, red and rough tongue (think hyperglycemia S+S)
  - neurological-
    - early: lethargy, weakness, irritability
    - severe: agitation, mania, delirium, seizures, coma, nuchal rigidity, increased deep tendon reflexes