Hyponatremia

Low Sodium Blood, Below 135 mEq/L.

- Sodium is present outside the cell- (Cl^-). (Intracell → K^+, PO_4^{3-}, Mg^{1}).

Causes:

Hyponatremia — Losing more Na concentration than water.
- Gaining more H_2O than Sodium.

Causes & Pathophysiology

1) Hypervolemic Hyponatremia. (Large H_2O ↑, Small Na^+ ↑)

Cirrhosis / Congestive Cardiac Failure (CCF) / Nephrotic syndrome / CKD. → Edema → Low circulating Volume.

Low circulating Volume → ADH ↑ → ↑↑ H_2O Retention
Low circulating Volume → Aldosterone ↑ → Retain Na^+

2) Hypovolemic Hyponatremia (Small H_2O ↑↓, Large Na^+ ↓)

i) Diarrhea and Vomiting → No reabsorption of Sodium.

ii) Diuretics → low Reabsorption of Na^+

iii) Cerebral Salt Wasting in Meningitis
↳ Depression of Sympathetic nervous system
↳ ↓ Reabsorption of Sodium.

iv) Burns →

3) Euvolaemic Hyponatremia — Eu → Normal - No edema.
↳ Normal Na^+
Increased H_2O ↑.

i) Dilute Urine → Polydipsia, Potomania (Beer).
→ Hypothyroidism.
→ Excess IV fluid.

ii) Concentrated Urine → SIADH. → H_2O Retention & Normal Na^+

False Hyponatremia (Normal Na^+ & H_2O)

→ Increased Triglyceride
OR
↑ Proteins (Multiple Myeloma)

→ Affects the lab instrument measures the Na^+ → ↓ Na^+ False

Clinical Features

→ Nausea, Vomiting, Muscle cramps.
→ Cerebral odema
  ↳ Confusion, Coma, Death
  → Increased Intracranial pressure → Ischemia
  → Herniation → Respiratory Failure.
  (Brain)

Mild (130-135 mmol/L) - None
Moderate (125-129 mmol/L) - Nausea, Delirium, Headache.
Severe (<124 mmol/L) - Vomiting, Somnolence, Seizure, Coma, Respiratory failure.

Investigation

- Edema → Hypervolemia Dehydration → Hypovolemia.
- Concentrated Urine → (>100 mosm/Kg) → SIADH
- Dilute Urine → Too much Fluid.
→ Urine Na^+
  → >20-40 mEq/L - SIADH & Cerebral Salt wasting
  → < 20 mEq/L - Hypovolemic

Management → Hypovolemia → Fluid, SIADH - Restriction
Severe Hyponatremia - Hypertonic Saline.