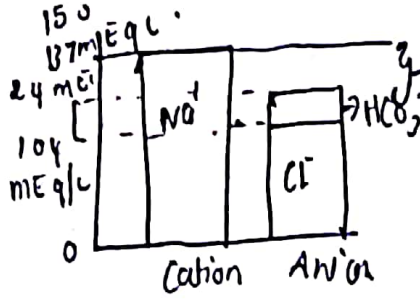
Metabolic Acidosis.

↓↓ HCO_3^- in Blood ↳ Lower PH < 7.35

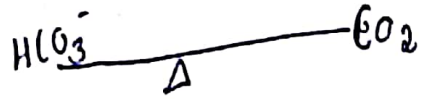
Normally Blood PH : Acidr ↓ PH & Bases ↑ PH

(+) Cation = Anion (-)



↳ Anion Gap
137 - (104 + 24)
= 9 mEq/L)

Anion Gap - (5 - 11 mEq/L) ⇒ Unmeasured anionr
↳ (Organic acids, Albumin)
Phosphate, Sulphate.



→ Due to increased CO_2 or lowr of HCO_3^-

Ethopathophiriology

$H_0CO_3^- + H^+ \rightarrow H_2CO_3$
↓
Carbonic acid
↓
$CO_2 + H_2O$

1) Increased anion gap:
↳ Due to acid overload.

a) Endogenour acid load.
↳ Increased production by body.
i) Lactic acidosis (Shock, Hepatic disease)
↳ ↓ O_2 Delivery to tissue → ↑↑ Anaerobic metabolism
↓
↑ Lactic acid in blood.

ii) Diabetic Ketoacidosis.
→ Lack of insulin → Forcr cellr to ure fat as enrgy.
→ Fat converted to Ketoacidr [Acetoacetic acid & β-Hydroxybutric acid]

iii) Kidney disease
→ Uric acid & Sulphur containing acidr are retained.

b) Exogenous acid load

Organic acid → Ingested accidentally → 1) Oxalic acid (Ethylene Glycol)
2) Formic acid (Methanol)
3) Hippuric acid (Toluene).

→ They contain H^+ and they bind to HCO_3^- and form acid (CO_2) and decreased bicarbonate.

2) Normal anion gap (Hyperchloremic metabolic acidosis)

→ Due to ↓↓↓ HCO_3^- & cause ↑↑↑ Cl^-.

1) Severe Diarrhea, → HCO_3^- rich intestinal & pancreatic secretions are not retained → ↓↓↓ HCO_3^-.

2) ~~Type~~ II Renal Tubular acidosis.

→ Unable to excrete H^+ ions

→ Unable to reabsorb, HCO_3^-, and instead more Cl^- absorption.

Compensatory mechanisms

① Moving H^+ from blood to cells in exchange of K^+.

↳ Hyperkalemia & Help acidosis.

→ Not occuring in Organic acid.

② Respiratory system

→ Chemoreceptors in carotid & aortic → ↓↓PH → Respiratory Centre in medulla

↓

↑↑ Respiratory rate & depth → ↑ Minute ventilation → ↑ CO_2 expiration → ↑↑ PH.

③ Kidney → If not due to kidney problem.

→ Excrete more H^+ ions and reabsorb more HCO_3^- ions.

Clinical features - Usually of underlying disease.

1) Increased
   ⊕ shock, liver problems ② Diabetes ③ kidney problems.
Exogenous → Poisoning of methanol, paint, oxalic acid.
2) Normal gap → Diarrhea, renal tubular acidosis.
→ Increased depth & rate of breathing.

Investigation

① Blood gas analysis → PCO_2 ↓ (<45 mm of Hg)
② Electrolyte (Na → 135-145 mEq/L, Normal on increase, Chloride - 95-105 mEq/L)
   ↑ Potassium - 3.5 - 5 mmol/L, ↓ HCO_3^- - 22-26 Eq/L).
③ Anion gap → Raised (5-11 mmol/L)
   ↓ Normal
④ ↑ Lactic acid (>2 mmol/L) ↑ Hepatic enzymes.
⑤ ↑ Blood glucose, ↓ Insulin ↑ HbA1C, ↑ ketones in urines.
⑥ Urea & Creatine → kidney disease.

Management

- Treating the underlined causes.
- Diarrhea & shock
- Insulin Injections
→ Removing toxins by dialysis.
→ Intravenous Bicarbonate should not be done because it causes Hypokalemia.