

Acid-Base Imbalance Summary Chart

Respiratory Acidosis

Cause: Hypoventilation (e.g., COPD, drug overdose)

Mechanism: CO₂ retention leads to increased carbonic acid and decreased pH

Compensation: Kidneys retain bicarbonate (HCO₃)

Clinical Clues: Confusion, lethargy, shallow breathing

Respiratory Alkalosis

Cause: Hyperventilation (e.g., anxiety, pain, fever)

Mechanism: CO₂ loss leads to decreased carbonic acid and increased pH

Compensation: Kidneys excrete bicarbonate (HCO₃)

Clinical Clues: Lightheadedness, tingling, rapid breathing

Metabolic Acidosis

Cause: Acid gain (e.g., DKA, lactic acidosis) or bicarbonate loss (e.g., diarrhea)

Mechanism: Decreased bicarbonate (HCO₃) leads to decreased pH

Compensation: Lungs increase ventilation to blow off CO₂

Clinical Clues: Kussmaul respirations, fatigue, confusion

Metabolic Alkalosis

Cause: Bicarbonate gain (e.g., antacids) or acid loss (e.g., vomiting)

Mechanism: Increased bicarbonate (HCO₃) leads to increased pH

Compensation: Lungs retain CO₂ (hypoventilation)

Clinical Clues: Muscle cramps, irritability, slow breathing