

RESPIRATORY ACIDOSIS

Decreased pH that results from pulmonary CO₂ retention...

Hypoventilation leads to hypercapnia, resulting in excess H₂CO₃ production & acidaemia.

- In acute setting [HCO₃⁻] is normal.
- The transition to chronic respiratory acidosis is defined as the point where renal compensation manifests as [HCO₃⁻] retention.

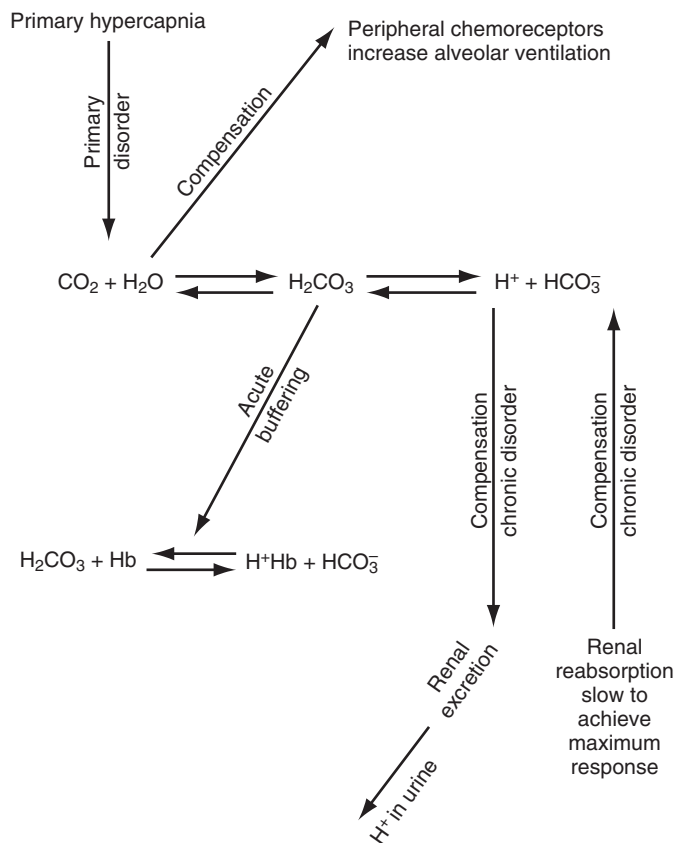


Figure 122-1. Respiratory acidosis and regulation.

BOX 122-1 CAUSES OF RESPIRATORY ACIDOSIS

Acute

- Airway disturbances
 - Obstruction (foreign body, bronchospasm, laryngospasm)
- Aspiration
- Drug-induced CNS depression
 - Alcohol
 - GHB/GABA toxicity
 - Narcotics
 - IV sedation
- Hypoventilation of muscular or CNS origin
 - Myasthenia gravis
 - CNS injury
 - Guillain-Barré syndrome
- Pulmonary disease
 - Pneumonia
 - Edema
- Thoracic cage disorders
 - Pneumothorax
 - Flail chest

Chronic

- Lung disease
 - Chronic bronchitis
 - Chronic obstructive pulmonary disease
 - Interstitial fibrosis
- Neuromuscular disorders
 - Myasthenia gravis
 - Muscular dystrophy
- Obesity with decreased alveolar ventilation

Clinical Features:

Caused by any disorder that results in a decrease in minute ventilation & CO₂ retention. The clinical picture depends on the severity & chronicity of the process as well as underlying comorbidities.

CO₂ narcosis is characterised by signs & symptoms such as;

- headache
- asterixis
- weakness or tremors
- blurred vision
- confusion
- somnolence.

Physiologic Compensation:

In acute respiratory acidosis, the only effective buffer is intracellular proteins.

- ***HCO₃ will rise by 1mmol/L for every 10mmHg rise in PaCO₂.***
- Profound acidaemia occurs quickly.

In chronic respiratory acidosis, renal retention of HCO₃ plays a significant role in buffering.

- ***HCO₃ will rise by 4mmol/L for every 10mmHg rise in PaCO₂.***
- Provides excellent compensation to nearly normal pH.

Management:

Therapy for acute respiratory acidosis is directed toward correction of minute ventilation & returning CO₂ to normal.

Options include;

- Definitive airway
- Artificial respiration (invasive vs non-invasive, BiPAP).
- Treatment of underlying pathology
 - Toxic or neurological condition.

For chronic respiratory acidosis, improving ventilation is also the goal.

- Bronchodilators
- Postural drainage
- Antibiotics for infection

Supplemental oxygen should be used with caution in patients with chronic respiratory acidosis, as this may reduce their hypoxic drive and minute ventilation leading to additional acidosis & CO₂ narcosis.