



Understanding ABGs

Understanding ABG Components

Before diving into ROME, it's essential to understand the primary components of an ABG:

1. **pH:** Indicates the acidity or alkalinity of the blood.
 - Normal range: 7.35 - 7.45
 - Below 7.35: Acidosis
 - Above 7.45: Alkalosis
2. **PaCO₂ (partial pressure of carbon dioxide):** Reflects the respiratory component.
 - Normal range: 35 - 45 mm Hg
 - Below 35: Alkalosis (respiratory)
 - Above 45: Acidosis (respiratory)
3. **HCO₃⁻ (bicarbonate):** Reflects the metabolic component.
 - Normal range: 22 - 26 mEq/L
 - Below 22: Acidosis (metabolic)
 - Above 26: Alkalosis (metabolic)



Applying the ROME Method

ROME: Respiratory Opposite, Metabolic Equal

Step-by-Step Interpretation

- Determine if the pH indicates acidosis or alkalosis:**
 - **pH < 7.35:** Acidosis
 - **pH > 7.45:** Alkalosis
- Analyze the PaCO₂ and HCO₃⁻ levels:**
 - Check if the PaCO₂ is moving in the opposite direction of the pH (respiratory component).
 - Check if the HCO₃⁻ is moving in the same direction as the pH (metabolic component).
- Identify the primary cause of the imbalance:**
 - If pH and PaCO₂ move in opposite directions, the problem is **Respiratory**.
 - **Respiratory Acidosis:** pH ↓, PaCO₂ ↑
 - **Respiratory Alkalosis:** pH ↑, PaCO₂ ↓
 - If pH and HCO₃⁻ move in the same direction, the problem is **Metabolic**.
 - **Metabolic Acidosis:** pH ↓, HCO₃⁻ ↓
 - **Metabolic Alkalosis:** pH ↑, HCO₃⁻ ↑
- Assess for compensation:**
 - **Compensated:** The pH is within the normal range (7.35 - 7.45), but PaCO₂ and HCO₃⁻ are abnormal, indicating the body is compensating.
 - **Partially Compensated:** The pH is abnormal, and both PaCO₂ and HCO₃⁻ are abnormal, indicating the body is trying to compensate.
 - **Uncompensated:** The pH is abnormal, and either PaCO₂ or HCO₃⁻ is abnormal, indicating no compensation is occurring.



Examples

1. Respiratory Acidosis:

- **pH:** 7.30 (Acidosis)
- **PaCO₂:** 50 mm Hg (↑, Opposite direction of pH, Respiratory)
- **HCO₃⁻:** 26 mEq/L (Normal or slightly increased if compensating)

2. Metabolic Alkalosis:

- **pH:** 7.48 (Alkalosis)
- **PaCO₂:** 40 mm Hg (Normal or increased if compensating)
- **HCO₃⁻:** 30 mEq/L (↑, Same direction as pH, Metabolic)

3. Partially Compensated Respiratory Alkalosis:

- **pH:** 7.47 (Alkalosis)
- **PaCO₂:** 30 mm Hg (↓, Opposite direction of pH, Respiratory)
- **HCO₃⁻:** 20 mEq/L (↓, Indicating compensation)

4. Partially Compensated Metabolic Acidosis:

- **pH:** 7.32 (Acidosis)
- **PaCO₂:** 28 mm Hg (↓, Indicating compensation)
- **HCO₃⁻:** 18 mEq/L (↓, Same direction as pH, Metabolic)

5. Uncompensated Respiratory Alkalosis:

- **pH: 7.50 (Alkalosis)**
- **PaCO₂: 30 mm Hg (↓, indicating respiratory cause)**
- **HCO₃⁻: 24 mEq/L (Normal)**

6. Uncompensated Metabolic Acidosis:

- **pH: 7.32 (Acidosis)**
- **PaCO₂: 40 mm Hg (Normal)**
- **HCO₃⁻: 18 mEq/L (↓, indicating metabolic cause)**

Review

The ROME method is a straightforward way to interpret ABGs:

- **Respiratory Opposite:** PaCO₂ and pH move in opposite directions.
- **Metabolic Equal:** HCO₃⁻ and pH move in the same direction.



Practice Questions

1. A patient's ABG results are: pH 7.28, PaCO₂ 55 mm Hg, HCO₃⁻ 24 mEq/L.
 - a. What is the interpretation?
2. A patient's ABG results are: pH 7.50, PaCO₂ 28 mm Hg, HCO₃⁻ 22 mEq/L.
 - a. What is the interpretation?
3. A patient's ABG results are: pH 7.36, PaCO₂ 48 mm Hg, HCO₃⁻ 26 mEq/L.
 - a. What is the interpretation?
4. A patient's ABG results are: pH 7.29, PaCO₂ 38 mm Hg, HCO₃⁻ 17 mEq/L.
 - a. What is the interpretation?
5. A patient's ABG results are: pH 7.60, PaCO₂ 35 mm Hg, HCO₃⁻ 29 mEq/L.
 - a. What is the interpretation?
6. A patient's ABG results are: pH 7.33, PaCO₂ 50 mm Hg, HCO₃⁻ 26 mEq/L.
 - a. What is the interpretation?
7. A patient's ABG results are: pH 7.48, PaCO₂ 44 mm Hg, HCO₃⁻ 29 mEq/L.
 - a. What is the interpretation?
8. A patient's ABG results are: pH 7.25, PaCO₂ 60 mm Hg, HCO₃⁻ 25 mEq/L.
 - a. What is the interpretation?
9. A patient's ABG results are: pH 7.44, PaCO₂ 40 mm Hg, HCO₃⁻ 26 mEq/L.
 - a. What is the interpretation?
10. A patient's ABG results are: pH 7.31, PaCO₂ 42 mm Hg, HCO₃⁻ 20 mEq/L.
 - a. What is the interpretation?



Answers

1. **Uncompensated Respiratory Acidosis**
 - pH 7.28 (Acidosis)
 - PaCO₂ 55 mm Hg (↑, respiratory)
 - HCO₃⁻ 24 mEq/L (Normal)
2. **Uncompensated Respiratory Alkalosis**
 - pH 7.50 (Alkalosis)
 - PaCO₂ 28 mm Hg (↓, respiratory)
 - HCO₃⁻ 22 mEq/L (Normal)
3. **Compensated Respiratory Acidosis**
 - pH 7.36 (Normal, leaning towards acidosis)
 - PaCO₂ 48 mm Hg (↑, respiratory)
 - HCO₃⁻ 26 mEq/L (Normal, indicating compensation)
4. **Uncompensated Metabolic Acidosis**
 - pH 7.29 (Acidosis)
 - PaCO₂ 38 mm Hg (Normal)
 - HCO₃⁻ 17 mEq/L (↓, metabolic)
5. **Uncompensated Metabolic Alkalosis**
 - pH 7.60 (Alkalosis)
 - PaCO₂ 35 mm Hg (Normal)
 - HCO₃⁻ 29 mEq/L (↑, metabolic)
6. **Uncompensated Respiratory Acidosis**
 - pH 7.33 (Acidosis)
 - PaCO₂ 50 mm Hg (↑, respiratory)
 - HCO₃⁻ 26 mEq/L (Normal)
7. **Uncompensated Metabolic Alkalosis**
 - pH 7.48 (Alkalosis)
 - PaCO₂ 44 mm Hg (Normal)
 - HCO₃⁻ 29 mEq/L (↑, metabolic)
8. **Uncompensated Respiratory Acidosis**
 - pH 7.25 (Acidosis)
 - PaCO₂ 60 mm Hg (↑, respiratory)
 - HCO₃⁻ 25 mEq/L (Normal)
9. **Normal ABG**
 - pH 7.44 (Normal)
 - PaCO₂ 40 mm Hg (Normal)
 - HCO₃⁻ 26 mEq/L (Normal)
10. **Uncompensated Metabolic Acidosis**
 - pH 7.31 (Acidosis)
 - PaCO₂ 42 mm Hg (Normal)
 - HCO₃⁻ 20 mEq/L (↓, metabolic)