

Interpreting ABG's

The X-Y-Z's of ABG's

- pH – acid-base balance stuff
- pO₂ – someone who is p.o.'ed twice
- pCO₂ – two commanding officers that are p.o.'ed
- NaHCO₃ – chemical name for bicarbonate (which is needed for the upset stomach incurred while trying to figure out ABG's)

Normal pH – 7.35-7.45

- Lower pH – acidosis – more hydrogen ions
- Higher pH – alkalosis – fewer hydrogen ions

● 3 lines of defense:

- Buffer system
- Respiratory
- Renal

The Buffer Systems

- Bicarbonate**
- Phosphate
- Protein
- Hemoglobin

The Buffer System

- Acts like a chemical sponge
- Carbonic acid = 1/20 = pH 7.4
Base bicarbonate
- Ratio more important than numbers
- Happens in less than a second
- Adjusts quickly but not completely

Respiratory System

- Works 1-3 minutes
- Only 50-75% efficient
- Regulates level of H₂CO₃ (breaks down into H⁺ and HCO₃⁻) – need CO₂ to make hydrochloric acid – so lungs keep or release CO₂

Renal System

- Most powerful
- But requires several hours to a day to work

- Adjusts both the Hydrogen ion concentration and the bicarbonate ion concentration

Respiratory Acidosis – pH < 7.35

- Cause: hypoventilation due to CNS depression or obstructive lung disease
- Kidneys try to compensate by retaining HCO₃
- Sx – BP changes, HA, decrease respirations, restlessness, confusion, tachycardia
- CO₂ increasing

Metabolic Acidosis – pH < 7.35

- Cause: starvation, renal impairment, diabetes or excessive intake of acids (increase acid) or diarrhea (decreasing bicarbonate)
- Respiratory system tries to compensate by blowing off CO₂ – Kussmaul respirations
- Sx: decrease BP, arrhythmias, lethargy, coma
- HCO₃ decreases

Respiratory Alkalosis – pH > 7.45

- cause: hyperventilation
- Renal system tries to compensate
- Sx: dizziness, hyperventilation, light-headedness, muscle cramps and spasms, paresthesias, palpitations
- PaCO₂ decreasing

Metabolic Alkalosis – pH > 7.45

- Cause: excess intake of baking soda or other alkali or prolonged vomiting/NG drainage
- Respiratory system tries to compensate
- Sx: arrhythmias, confusion, apathy, stupor, hypoventilation, muscle weakness
- HCO₃ increasing

Compensation

- Compensating – the other system is moving in the opposite direction – does mean that it has succeeded

- Compensated – the pH has returned to normal – 7.35-7.45

How to Interpret ABG's

- pH – 7.4 (7.35-7.45) *ABG*
- pCO₂ – 40 (35-40) *ABG*
- HCO₃ – 27 (21-28) *ABG*
- pO₂ – 80-100

- O2 sat - >95%

How to Interpret ABG's

- Look at pH:
 - 7.4 = N (normal)
 - > 7.4 = B (base)
 - < 7.4 = A (acid)

How to Interpret ABG's

- Look at PCO2
 - 40 mmHg=N(normal)
 - >40=A
 - <40=B

How to Interpret ABG's

- Look at Bicarbonate concentration (HCO3):
 - 27 mEq/l = N
 - >27 = B
 - <27 =A

How to Interpret ABG's

- Interpret the results
- Circle letters that are the same.
 - If two "A"s = acidosis
 - If two "B"s = alkalosis
 - If PCO2 corresponds with pH = respiratory
 - If Bicarb corresponds with pH = metabolic

– _If uncircled variable is moving in the opposite direction – compensation is occurring

How to Interpret ABG's

Key point: Think about the patient – review the whole clinical picture.

Does it make sense!!!

2 A's = Acidosis
HCO3 matches pH = Metabolic

Metabolic Acidosis

2 B's = Alkalosis
pCO2 matches pH = Respiratory

Respiratory Alkalosis

2 A's = Acidosis
HCO3 matches pH = Respiratory
Bicarb moving in the opposite direction

Compensating Respiratory Acidosis

- pH 7.6, PCO2 31, HCO3 24:
- pH 7.2, PCO2 50, HCO3 26:
- pH 7.32, PCO2 42, HCO3 28:
- pH 7.56, PCO2 41, HCO3 40:
pH 7.39, PCO2 52, HCO3 30:

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