Interpreting ABG’s

The X-Y-Z’s of ABG’s

- pH – acid-base balance stiff
- pO2 – someone who is p.o.’ed twice
- pCO2 – two commanding officers that are p.o.’ed
- NaCHO3 – 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
- Ration more important than numbers
- Happen 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 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 (7.34-7.45)
• pCO2 – 40 (34-40)
• HCO3 – 27 (21-28)
• 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 compensation (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 occurring

How to interpret ABG’s

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

Does it make sense!!!

2A’s = Acidosis
HCO3 matches pH = Metabolic

Metabolic Acidosis

2B’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: