

Blood Gas Interpretation

Dr Mark Putland
Co-DEMT
Bendigo Health Care Group
April 2012

Acid-Base

- **Acidosis**

- Normally H^+ is paired with HCO_3 and pH is 7.4
- Low pH means extra H^+ or missing HCO_3
- Anion gap increased
 - Means extra H^+ paired with some unmeasured anion is on board
 - Renal
 - Liver
 - Keto
 - Lactic
 - Exogenous

Acid-Base

- Acidosis
 - Normally H^+ is paired with HCO_3 and pH is 7.4
 - Low pH means extra H^+ or missing HCO_3
 - Anion gap decreased
 - Means bicarb has gone missing
 - Gut
 - Kidneys
 - Excess chloride

Acid-Base

- Alkalosis
 - Euvolaemic to wet ($uCl^- > 15$)
 - Saline unresponsive
 - Cushing's
 - Hyperaldosteronism
 - Severe hypokalaemia

Acid-Base

- Rules
 - Fun for exams and impressing medical students
- Metabolic acidosis
 - $\text{CO}_2 = 1.5 \times \text{HCO}_3 + 8$
- Metabolic alkalosis
 - $\text{CO}_2 = 0.9 \times \text{HCO}_3 + 9$
- Respiratory acidosis
 - HCO_3 goes up by 1 (acute) and 4 (chronic) for every 10 the CO_2 is increased
- Respiratory alkalosis
 - HCO_3 goes down by 1 (acute) and 2 (chronic) for every 10 the CO_2 decreases

Venous Blood Gas

- Pretty much the only blood gas you should do in a patient without an arterial line now days

Venous Blood Gas

- pH
 - Accurate to within 0.05 units
 - Tends toward the more acidic side within this range
 - No clinically meaningful difference

Venous Blood Gas

- $PvCO_2$
 - VBG is a screen for hypercapnea
 - Actual venous $PvCO_2$ depends on metabolic demand in drained tissues
 - Normal $PvCO_2$ means $PaCO_2$ will not be high
 - High ($>60\text{mmHg}$) $PvCO_2$ means elevated $PaCO_2$ is likely
 - Use the pH and Bicarb to decide if you trust the $PvCO_2$

Venous Blood Gas

- PvO_2
 - Not meaningful
 - Look at the Sat probe instead.
 - $SpO_2 < 85\%$ is unreliable but if the SpO_2 is $< 85\%$ the patient is sick. Fix it, don't measure it.
- HCO_3
 - Good but more result from U&E more trustable

Do I ever do an ABG?

- Convenient if an arterial line is present
- Useful if the Sat probe is not working or no one believes it
- When very fine control of ventilation is required in a tubed patient (put in an arterial line)