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Arterial Blood Gas Interpretation

1) Acidaemia or alkalaemia?

pH must be between 7.35 and 7.45.

LOWER = acidosis.

You either have too much acid (eg. CO2 retention) or you lost a lot of alkali

HIGHER = alkalosis.

Youve either lost a lot of acid, eg. with vomiting, or you got a lot of alkali on board.

NEITHER = mixed disorder or well compensated

(eg. despite your CO2 retention, you managed to generate enough bicarbonate to keep you pH inside the normal rangeSTILL ABNORMAL !!)

Compensation of RESPIRATORY problems must come from the kidneys (metabolic compensation) because the diseased lungs surely cant take care of it any more. Likewise, metabolic problems must be handled by respiratory compensation. ONE ORGAN DOES WHAT THE OTHER CANNOT.

2) RESPIRATORY OR METABOLIC?...

...And IS IT COMPENSATED?

PCO2: the respiratory acid; should match what the pH is doing if its a respiratory cause.	**HCO3**: **bicarb,** the metabolic alkali; tries to compensate for CO2 derangements. Takes 12-24 hours to spring into action.
HIGH PCO2 and LOW pH Its probably the CO2 making things that acidic. ***= RESPIRATORY ACIDOSIS***	**To compensate for low pH, the bicarb should RISE, though it takes a while.** ***HIGH BICARB: COMPENSATED*** ***LOW BICARB: UNCOMPENSATED***
LOW PCO2 and LOW pH Its very strange, becasue normally the lungs will compensate for acidosis by breathing off some of the CO2. So it seems they have, because the CO2 is low. But the pH is still low- because there is not enough CO2 to compensate for the drop in pH (even if you huff away ALL of your CO2, you'll still be acidotic) – so the lungs arent at fault, and its probably ***= METABOLIC ACIDOSIS***	The cause of acidosis here is probably the kidneys. So it is folly to look at the bicarb, because the mechanisms of its making have gone haywire. The compensation of anything METABOLIC must come from the lungs. THUS: ***Low PCO2, Low pH = COMPENSATED*** (to compensate for metabolic acidosis, the lungs attempt to dump CO2 into the wind) ***Normal PCO2, Low pH = UNCOMPENSATED*** (for some reason the lungs arent even trying to help the struggling kidneys)
LOW PCO2 and HIGH pH Makes sense- no CO2 means no acid in the bloodstream, and thus the pH shifts into the alkaline range. This happens when you hyperventilate. ***= RESPIRATORY ALKALOSIS***	Since loss of CO2 is your problem here, its likely that it happened fast and the bicarb has not had any chance to compensate for it. BUT- if its a chronic issue, then the bicarb will reduce. THUS: ***Low PCO2, Normal bicarb = UNCOMPENSATED*** ***LowPCO2, High bicarb = COMPENSATED***
HIGH PCO2 and HIGH pH So despite the high CO2, you still havent got enough acid in you to drop your pH back into the normal range. Theoretically if you kept pumping CO2 into the blood, you would eventually be able to balance out the alkali. HOWEVER in reality your PCO2 cannot go much higher than about 55. At this level, the respiratory centres of the rain will stimulate breathing, and you will start to lose CO2. ***= METABOLIC ALKALOSIS***	Hmm, there seems to be a whole lot of metabolic alkali in the blood. Perhaps a stupid intern has infused too much sodium bicarb into an acidotic patient. Nevermind. The bicarb will be elevated. This can only be compensated by respiratory means, so look ye to the CO2 and see what its doing: ***High bicarb, Normal PCO2 = =UNCOMPENSATED*** ***High bicarb, , High PCO2 = COMPENSATED***

...There is also BASE EXCESS:

excess or deficit (positive or negative base excess)points to METABOLIC causes

normal base excess points to short-term RESPIRATORY causes