

ABG Card

- ① Check *pH* on blood gas: *acidemia* (\downarrow pH)? *alkalemia* (\uparrow pH)? *eupHemia* (normal pH)?
- ② Check *bicarb* on chem panel and *pCO₂* on gas.
 \downarrow pH with \downarrow [HCO₃⁻], or \uparrow pH with \uparrow [HCO₃⁻], is primary *metabolic acidosis* or *alkalosis*.
 \downarrow pH with \uparrow pCO₂, or \uparrow pH with \downarrow pCO₂, is primary *respiratory acidosis* or *alkalosis*.
- ③ Check for expected compensation:

For *metabolic acidosis*, *Winters' equation*:

$$pCO_2 = 1.5([HCO_3^-]) + 8 \pm 2 = \text{last 2 digits of pH}$$

(lactic acidosis may overcompensate 2° CNS effects)

For *metabolic alkalosis* or *acidosis*:

$$pCO_2 = \text{last 2 digits of the pH} = [HCO_3^-] + 15$$

(for [HCO₃⁻] from 8 to 35)

For *respiratory acidosis*:

$$\uparrow pCO_2 \ 10 = \downarrow pH \ .08 \ (\text{acute})$$

$$\uparrow pCO_2 \ 10 = \downarrow pH \ .03 \ (\text{later: metabolic comp.})$$

For *respiratory alkalosis*:

$$\downarrow pCO_2 \ 10 = \uparrow [HCO_3^-] \ 2 \ (\text{acute})$$

$$\downarrow pCO_2 \ 10 = \uparrow [HCO_3^-] \ 5 \ (\text{chronic/compensated})$$

- ④ For metabolic acidosis, is it *anion gap* or *non-anion gap* acidosis? mixed disorder? $AG = [Na^+] - ([Cl^-] + [HCO_3^-])$. If all acidosis from anion-gap acids, then $\uparrow AG$ should = $\downarrow [HCO_3^-]$.

If AG 20 (nl 12), [HCO₃⁻] 19 (nl 27), then all acidosis ($\downarrow [HCO_3^-]$ 8) is from $\uparrow AG$ from excess organic acids.

Normal *Venous* Blood Gas values:

pH	7.32-7.42	0.03 less than arterial (7.35-7.45)
pCO ₂	46	6 more than arterial: (40)

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SaO ₂	PaO ₂ @pH		PaO ₂ @pH		PaO ₂ @pH	
	7.3	7.4	7.4	7.5	7.5	7.5
99	171	158	158	143	143	143
98	122	111	111	101	101	101
97	101	92	92	84	84	84
96	89	82	82	74	74	74
95	82	74	74	68	68	68
94	76	69	69	63	63	63
93	72	66	66	60	60	60
92	68	62	62	57	57	57
91	66	60	60	55	55	55
90	63	58	58	53	53	53
88	59	54	54	49	49	49
86	56	51	51	47	47	47
84	53	49	49	44	44	44
82	51	47	47	42	42	42
80	49	45	45	41	41	41
78	47	43	43	39	39	39
76	45	41	41	38	38	38
74	44	40	40	35	35	35
72	42	39	39	34	34	34

High Anion Gap Metabolic Acidoses

- K** ketoacidosis
- U** uremia
- S** salicylates
- M** methanol/ethylene glycol/paraldehyde
- A** alcohol (EtOH)
- L** lactic acidosis

Normal Anion Gap (Hyper- chloremic) Metabolic Acidoses

- High K⁺**
 - hyperal, \uparrow amino acid catabolism \bar{p} \downarrow pCO₂ (takes while for HCO₃⁻ to \uparrow)
 - dilutional
 - hypoaldo (\downarrow renin, adrenal dysfunction)
 - NH₄Cl, CaCl₂, lysine, arginine (\approx adds HCl)
- Low K⁺**
 - GI – diarrhea, fistulas (K⁺ loss, aldo)
 - GU – surgical ureteral conduits
 - RTA – Renal Tubular Acidosis. Complex.