

ABGS

# Normal Values

- pH 7.35-7.45
- PaCO<sub>2</sub> 4.5-6 kPa (35-50 mm Hg)
- PaO<sub>2</sub> 11-14 kPa (83-105 mm Hg)
- Standard bicarbonate 22-28 mmol/l
- Anion gap 10-16 mmol/l
- Chloride 98-107 mmol/l
- BE -2 to +2

# respiratory

- Respiratory Acidosis
- Hypercapnia due to ventilatory failure
- Respiratory alkalosis
- pH change due to hyperventilation and CO<sub>2</sub> loss

# metabolic

- Metabolic acidosis
- Lots of causes  
Need to know anion gap to help work out cause
- Metabolic alkalosis
- commonest cause dehydration due to diuretics

# Whats the anion gap?

Difference between + and - ions

Na and K

Cl and HCO

Helps to find cause of the metabolic acidosis

Too much acid ( $\uparrow$ anion gap) or increase loss of HCO (normal anion gap)

Anion gap  
 $(\text{Na} + \text{K}) - (\text{Cl} + \text{HCO})$   
normal range 10-16mmol

# MUDPILES

**Raised anion gap**  
(too much acid)

**M**ethanol

**U**raemia

**D**KA

**P**araldehyde

**I**ron/**I**soniazid

**L**actic acidosis (shock/  
sepsis)

**E**thanol, ethylene glycol

**S**alicylates

**Normal anion gap**  
(too much bicarb loss)

**D**iarrhoea

**F**istula

**R**enal Tubular acidosis

**C**arbonic anhydrase  
inhibitors  
(acetazolamide)

# 30 year old male in status epilepticus

pH 7.05

pO<sub>2</sub> 15

pCO<sub>2</sub> 8

HCO 16

BE -9



# Mixed acidosis

- Respiratory acidosis due to hypoventilation due to diazepam and status
- Metabolic acidosis due to lactic acid build up during fit.

# 16 year old asthmatic

- pH 7.35
- $pO_2$  15 KPa
- **$pCO_2$  4.5 KPa**
- $HCO_3^-$  23 mmol/L
- BE +2

# Normal CO<sub>2</sub>

- Expect a hyperventilating patient to have a low CO<sub>2</sub>. The “normal” CO<sub>2</sub> puts the patient into the severe acute asthma group.

(NB A raised puts the patient into near fatal asthma group)

# Near Fatal asthma

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- pH 7.35

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- pH 7.35
- pO<sub>2</sub> 15
- pCO<sub>2</sub> 6.1

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- pH 7.35
- pO<sub>2</sub> 15
- pCO<sub>2</sub> 6.1
- HCO 22



# Near Fatal asthma

- pH 7.35
- pO<sub>2</sub> 15
- pCO<sub>2</sub> 6.1
- HCO<sub>3</sub> 22
- BE +2

30 year old male with 5 day Hx of  
SOB.

CXR shows  
pneumothorax.

ABGs:

pH 7.46

P02 15L

pC02 3.0

HCO 16

BE 3

- Resp alkalosis with renal compensation.
- 5 day Hx means time for renal compensation (hence HCO being low)

# summary

- Anion gap helps find cause of metabolic acidosis
- $(\text{Na} + \text{K}) - (\text{Cl} + \text{HCO})$
- MUDPILES increased anion gap
- Normal CO<sub>2</sub> in asthma is abnormal