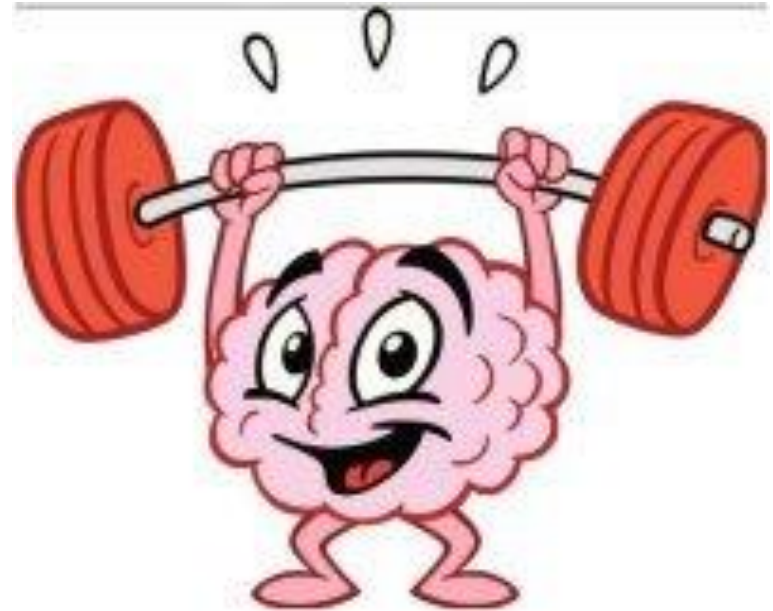


BRAIN TEASERS

DR. RAIHAN RABBANI

ACID BASE



Examples

21 yo woman presents with confusion, fever, flank pain, “breathing heavy”. Known to be diabetic.

7.32/28

140	104
	14

Primary disorder = metabolic acidosis

Winter's formula: expected $p\text{CO}_2 = 29$ (ok)

AG = 22; expected $\text{HCO}_3 = 10 + 14 = 24$ (ok)

Anion gap metabolic acidosis

DKA with Pyelonephritis



Examples

58 yo man presents with 4d cough, diarrhea. Chest x-ray shows LLL infiltrate. Pt's breath smells of alcohol.

7.31/10

123	99
	5

Primary disorder = metabolic acidosis

Winter's formula: expected $p\text{CO}_2 = 15$, so concurrent respiratory alkalosis

AG = 19; expected $\text{HCO}_3 = 5 + 5 = 10$, so non-anion gap metabolic acidosis

Anion gap metabolic acidosis, non-anion gap metabolic acidosis,
respiratory alkalosis

Alcoholic ketoacidosis, diarrhea, pneumonia



Examples

58 yo man with 4d cough, vomiting, altered mental status

7.50/20

145	100
	15

Respiratory alkalosis

AG = 30, so concurrent anion gap metabolic acidosis

Expected $\text{HCO}_3^- = 18 + 15 = 33$ so concurrent metabolic alkalosis

Respiratory alkalosis, anion gap metabolic acidosis, metabolic alkalosis

Pneumonia, ketoacidosis (DKA, ETOH, LA) vomiting



Examples

40yr male, Mountain climber, got labs done after 3 weeks of a 15000 ft base camp arrival.

Clinical exam was normal .

$$7.44/25 \qquad \begin{array}{c|c} 136 & 108 \\ \hline & 18 \end{array}$$

Alkalosis – resp (for 15 decrease in PCO_2 , pH change is ~0.04)

Expected HCO_3^- – for 15 decrease in PCO_2 ; 6 drop in HCO_3^-

AG ($136 - 126$) = 10

No Acidosis

Well compensated Resp Alkalosis

Hyperventilation with Chronic Resp Alkalosis (compensated)



Examples

56yr female with known stage V CKD

Came to ER with SOB, On exam tachypnea, Normal lung,
No fever. CxR normal.

7.28/30

$$\begin{array}{r|l} 131 & 106 \\ \hline & 16 \end{array}$$

Acidosis – Metabolic

Expected PCO_2 – $[(16 \times 1.5) + 8] \pm 2 = 30 - 34$ (well compensated)

AG $(131 - 122) = 09$

NAGMA

:: NAGMA + Resp Comp

RTA from CKD (NAGMA)



Examples

35 yo woman with DM presents obtunded

7.10/50

145	100
	15

Primary respiratory acidosis

AG = 30 so concurrent primary metabolic acidosis

Expected $\text{HCO}_3^- = 18 + 15 = 33$ so concurrent metabolic alkalosis

Resp Acidosis, AGMA, Met Alkalosis

Hypoventilation due to altered mental status, DKA, vomiting



Examples

60 year male recently discharged from hospital for treatment of aspiration pneumonia with levofloxacin and clindamycin. One week later, he presents to the ER with severe diarrhea, abdominal pain and hypotension.

7.29/25

$$\begin{array}{r|l} 129 & 99 \\ \hline & 10 \end{array}$$

Acidosis – Metabolic

Expected PCO_2 – $[(10 \times 1.5) + 8] \pm 2 = 21 - 25$ (well compensated)

AG $(129 - 109) = 20$, Delta Gap 8, Corrected HCO_3^- – 18

NAGMA

:: AGMA + Resp Comp + NAGMA

Sepsis from *C. diff* (AGMA) with Diarrhea (NAGMA)



Examples

42yr female presented with Falccid Paralysis

Also complaints of burning eyes and swallowing difficulty as mouth feels dry.

7.32/30

140	115
2.0	16

Acidosis – Metabolic

Expected PCO₂ – [(16X1.5)+8] ± 2= 30– 34 (well compensated)

AG (140-131) = 09

NAGMA

:: NAGMA + Resp Comp

UA – Normal with a pH 6.5. UAG 70 .

RTA (NAGMA)

Anti bodies – RA , Anti Ro & La – positive.

Diagnosis: RTA (type 1) with hypokalemic paralysis secondary to Sjogrens Syndrome)



Examples

56 yo man found vomiting on the street

7.40/40

145	100	192
3.6	24	9.1

Can't tell primary disorder by pH... but AG = 21

Expected $\text{HCO}_3^- = 9 + 24 = 33$ so concurrent metabolic alkalosis

Metabolic alkalosis and metabolic acidosis

Vomiting in the setting of worsening uremia due to CKD





THANKS AGAIN

