# Case 1

- **ABG's**

  **pH = 7,40**

  **$PO_2$ = 88 mmHg**

  **$PCO_2$ = 40 mmHg**

  **$HCO_3$ = 25 mEq/L**

# Case 1

An 18- year - old man came to the ER because of fever, vomiting and polyuria

**History**

- Type 1 diabetes, treated with insulin

**Vital signs**

- BP 100/70 mmHg; HR 102 bpm; RR 22 bpm; T 38°C; $SO_2$ 96%; GCS 14

**Physical exam**

- Patient well oriented, dehydrated skin and oral mucosa

# Case 1

- **ABG's**

pH = 7,40

$PO_2$ = 88 mmHg

$PCO_2$ = 40 mmHg

$HCO_3$ = 25 mEq/L

- **Electrolytes**

$Na^+$ = 140 mEq/L

$Cl^-$ = 88 mEq/L

$K^+$ = 4,2 mEq/L

**Anion gap: $Na^+ - (Cl^- + HCO_3)$ = 27 ( n.v. 8-16)**

**Ketonuria: +++**

**Blood glucose: 380 mg/dL**

# Case 1

**BE: 0 ( n.v. 0 ± 3)**

# Case 1

- **ABG's**

pH = 7,40

$PO_2$ = 88 mmHg

$PCO_2$ = 40 mmHg

$HCO_3$ = 25 mEq/L

- **Electrolytes**

$Na^+$ = 140 mEq/L

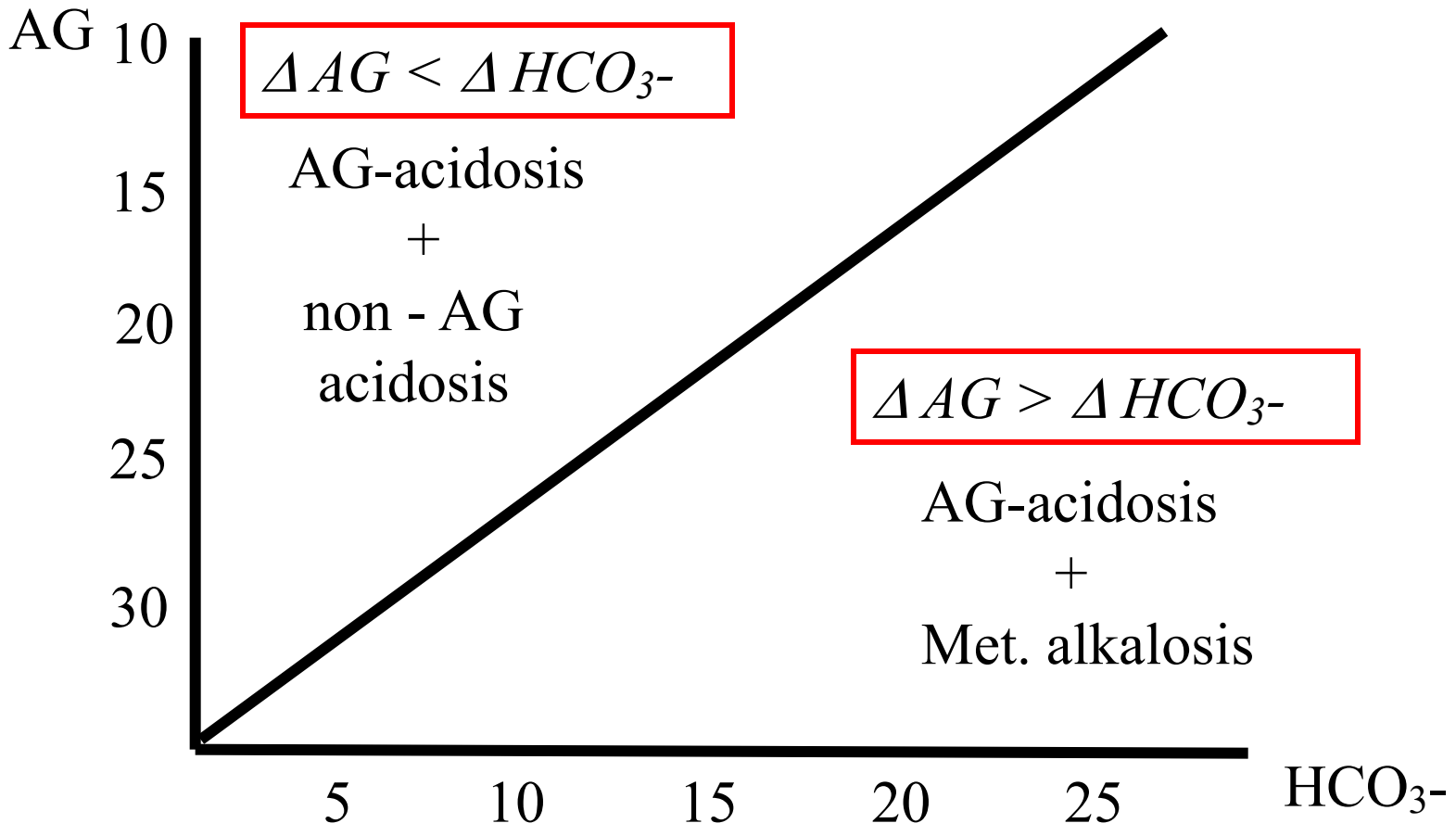
$Cl^-$ = 88 mEq/L

$K^+$ = 4,2 mEq/L

$$\Delta \text{Anion gap} = 27 - 12 = 15$$

$$\Delta HCO_3 = 25 - 24 = 1$$

# Δ AG / Δ $HCO_3$- (Δ / Δ)


AG
10
15
20
25
30
Δ AG < Δ HCO3-
AG-acidosis
+
non - AG
acidosis
Δ AG > Δ HCO3-
AG-acidosis
+
Met. alkalosis
5
10
15
20
25
HCO3-

# Valori decisionali del rapporto $\Delta AG/\Delta HCO^-_3$

| | |
|---|---|
| **< 0.4** | AM ipercloremica |
| **0.4 – 0.8** | AM ipercloremica + AM-Ag |
| **> 0.8 – 2** | AM-Ag |
| **> 2** | AM-Ag + Alcalosi metabolica |

# Case 1

- **ABG's**

pH = 7,40

$PO_2$ = 88 mmHg

$PCO_2$ = 40 mmHg

$HCO_3$ = 25 mEq/L

- **Electrolytes**

$Na^+$ = 140 mEq/L

$Cl^-$ = 88 mEqL

$K^+$ = 4,2 mEq/L

($PCO_2 > 0,7$ *if* $HCO_3 > 1$)

Expected $PCO_2$ = 40

Actual $PCO_2$ – Expected $PCO_2$ = 0

# Case 1

- **ABG's**

pH = 7,40

$PO_2$ = 88 mmHg

$PCO_2$ = 40 mmHg

$HCO_3$ = 25 mEq/L

- **Electrolytes**

$Na^+$ = 140 mEq/L

$Cl^-$ = 88 mEq/L

$K^+$ = 4,2 mEq/L

**AG metabolic acidosis**

**Metabolic alkalosis**

# Report interpretation

***What about this case ?***

- Never interpret the report without electrolytes.
- Normal pH does not mean normal ABG
- Normal BE does not mean the absence of metabolic acidosis
- Reduced serum $Cl^-$ compared to $Na^+$= metabolic alkalosis
- Evaluate relationship $\Delta AG / \Delta HCO_3$

# Case 2

A 40 -year- old man arrived to the ER because of fever and vomiting after chemotherapy (four days before)

**History**

Recurrence of non-Hodgkin lymphoma

**Vital signs**

BP 85/55 mmHg; HR 130 bpm; RR 38 bpm; T 39°C; $SO_2$ 96%; GCS 14.

**Physical exam:** Diffuse fine crackles (right lung). Enlarged liver and spleen.

**Chest X-ray :** Alveolar infiltrates (right lung)

**ECG:** Sinus tachycardia

# Case 2

- ABG's

pH = 7,66

$PO_2$ = 54 mmHg

$PCO_2$ = 19 mmHg

$HCO_3$ = 21 mEq/L

# Case 2

- **ABG's**

pH = 7,66

$PO_2$ = 54 mmHg

$PCO_2$ = 19 mmHg

$HCO_3$ = 21 mEq/L

- **Electrolytes**

$Na^+$ = 137 mEq/L

$Cl^-$ = 90 mEq/L

$K^+$ = 3,3 mEq/L

**BE: - 3 (n.v. 3 ± 3)**

Anion gap: $Na^+ - (Cl^- + HCO_3)$ = 26 ( n.v. 8-16)

# Case 2

- **ABG's**

**pH = 7,66**

**$PO_2$ = 54 mmHg**

**$PCO_2$ = 19 mmHg**

**$HCO_3$ = 21 mEq/L**

- **Electrolytes**

**$Na^+$ = 137 mEq/L**

**$Cl^-$ = 90 mEq/L**

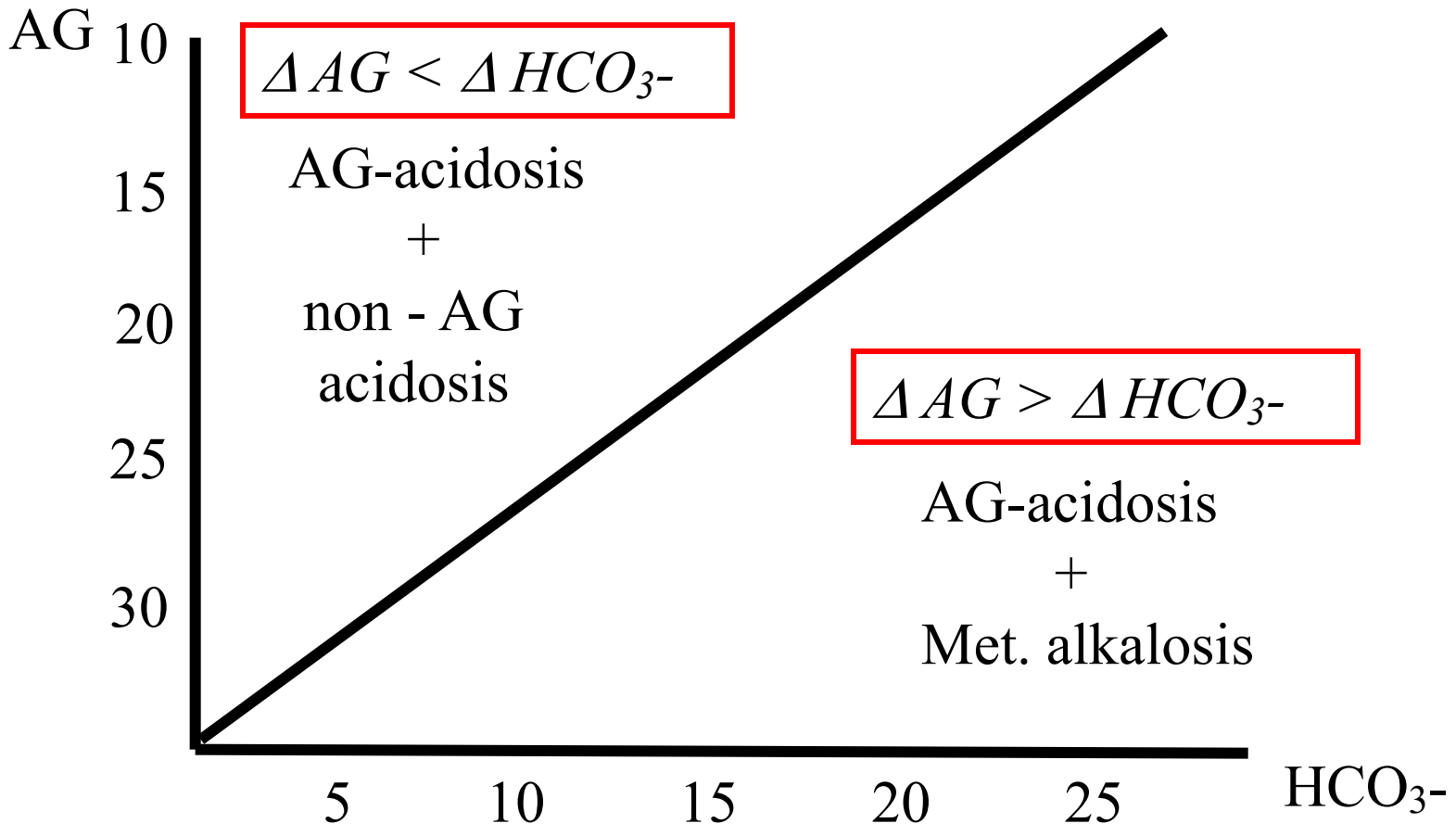
**$K^+$ = 3,3 mEq/L**

Anion gap: $Na^+ - (Cl^- + HCO_3) = 26$ ( n.v. 8-16)

**ΔAnion gap =** $26 - 12 = 14$

**$\Delta HCO_3$** $= 24 - 21 = 3$

# Δ AG / Δ $HCO_3$- (Δ / Δ)


AG
10
15
20
25
30
Δ AG < Δ HCO3-
AG-acidosis
+
non - AG
acidosis
Δ AG > Δ HCO3-
AG-acidosis
+
Met. alkalosis
5
10
15
20
25
HCO3-

# Valori decisionali del rapporto $\Delta AG/\Delta HCO^-_3$

| | |
|---|---|
| **< 0.4** | AM ipercloremica |
| **0.4 – 0.8** | AM ipercloremica + AM-Ag |
| **> 0.8 – 2** | AM-Ag |
| **> 2** | AM-Ag + Alcalosi metabolica |

# Case 3

- **ABG's**

pH = 7,66

$PO_2$ = 54 mmHg

$PCO_2$ = 19 mmHg

$HCO_3$ = 21 mEqL

- **Electrolytes**

$Na^+$ = 137 mEq/L

$Cl^-$ = 90 mEq/L

$K^+$ = 3,3 mEq/L

($PCO_2$ <1,2 *if* $HCO_3$ < 1)

Expected $PCO_2$ = 36,4

Expected $PCO_2$ – Actual $PCO_2$ = 17,4

# Case 3

- **ABG's**

pH = 7,66

$PO_2$ = 54 mmHg

$PCO_2$ = 19 mmHg

$HCO_3$ = 21 mEq/L

- **Electrolytes**

$Na^+$ = 137 mEq/L

$Cl^-$ = 90 mEq/L

$K^+$ = 3,3 mEq/L

**AG metabolic acidosis**
**Metabolic alkalosis**
**Respiratory akalosis**

**Lactic acid = 12 mmol/L**

# Report interpretation

***What about this case?***

- An alkaline pH (although very alkaline) does not exclude the presence of metabolic acidosis
- Always calculate the anion gap
- Normal BE does not mean absence of metabolic acidosis
- Measure serum lactate concentration, if possible

Nither anion gap nor base excess was capable of predicting lactate; therefore, lactate must be directly measured

Mikulaschek A et al. J Trauma. 1996;40:218-22

# Case 3

- **ABG's**

pH = 7,66

$PO_2$ = 54 mmHg

$PCO_2$ = 19 mmHg

$HCO_3$ = 21 mEqL

- **Electrolytes**

$Na^+$ = 137 mEq/L

$Cl^-$ = 90 mEq/L

$K^+$ = 3,3 mEq/L

($PCO_2$ <1,2 *if* $HCO_3$ < 1)

Expected $PCO_2$ = 36,4

Expected $PCO_2$ – Actual $PCO_2$ = 17,4

# Case 3

- **ABG's**

pH = 7,66

$PO_2$ = 54 mmHg

$PCO_2$ = 19 mmHg

$HCO_3$ = 21 mEq/L

- **Electrolytes**

$Na^+$ = 137 mEq/L

$Cl^-$ = 90 mEq/L

$K^+$ = 3,3 mEq/L

**AG metabolic acidosis**
**Metabolic alkalosis**
**Respiratory akalosis**

**Lactic acid = 12 mmol/L**

# Report interpretation

***What about this case?***

- An alkaline pH (although very alkaline) does not exclude the presence of metabolic acidosis
- Always calculate the anion gap
- Normal BE does not mean absence of metabolic acidosis
- Measure serum lactate concentration, if possible

Nither anion gap nor base excess was capable of predicting lactate; therefore, lactate must be directly measured

Mikulaschek A et al. J Trauma. 1996;40:218-22

# Case 3

An 83 – year - old woman came to the ED for vomiting, diarrhea lasting for three days and oliguria

**History**

- Hypertension, chronic heart failure, obesity, type 2 diabetes

**Therapy:**

- Metformin 500 mg three times a day, furosemide, 25 mg twice a day, irbesartan / hydrochlorothiazide 300mg/12,5 once a day

**Physical exam**: Confused and dehydrated

**Vital sign:** GCS 12; BP 150/90 mmHg; HR 75 bpm; RR 28 bpm; T 36°; $SO_2$ 100 %.

# Case 3

- **ABG's**

**pH = 6,92**

**$PO_2$ = 90,6 mmHg**

**$PCO_2$ = 27,6 mmHg**

**$HCO_3$ = 5,5 mEq/L**

- **Electrolytes**

**$Na^+$ = 140 mEq/L**

**$Cl^-$ = 87 mEq/L**

**$K^+$ = 5,2 mEq/L**

Lactic acid 18 mmol/L, creatinine 7,7 mg/dL, blood glucose 14 mg/dL

Anion gap: $Na^+ - (Cl^- + HCO_3) =$ 48 ( n.v. 8-16)

# Case 3

- **ABG's**

**pH = 6,92**

**$PO_2$ = 90,6 mmHg**

**$PCO_2$ = 27,6 mmHg**

**$HCO_3$ = 5,5 mEq/L**

- **Electrolytes**

**$Na^+$ = 140 mEqL**

**$Cl^-$ = 87 mEq/L**

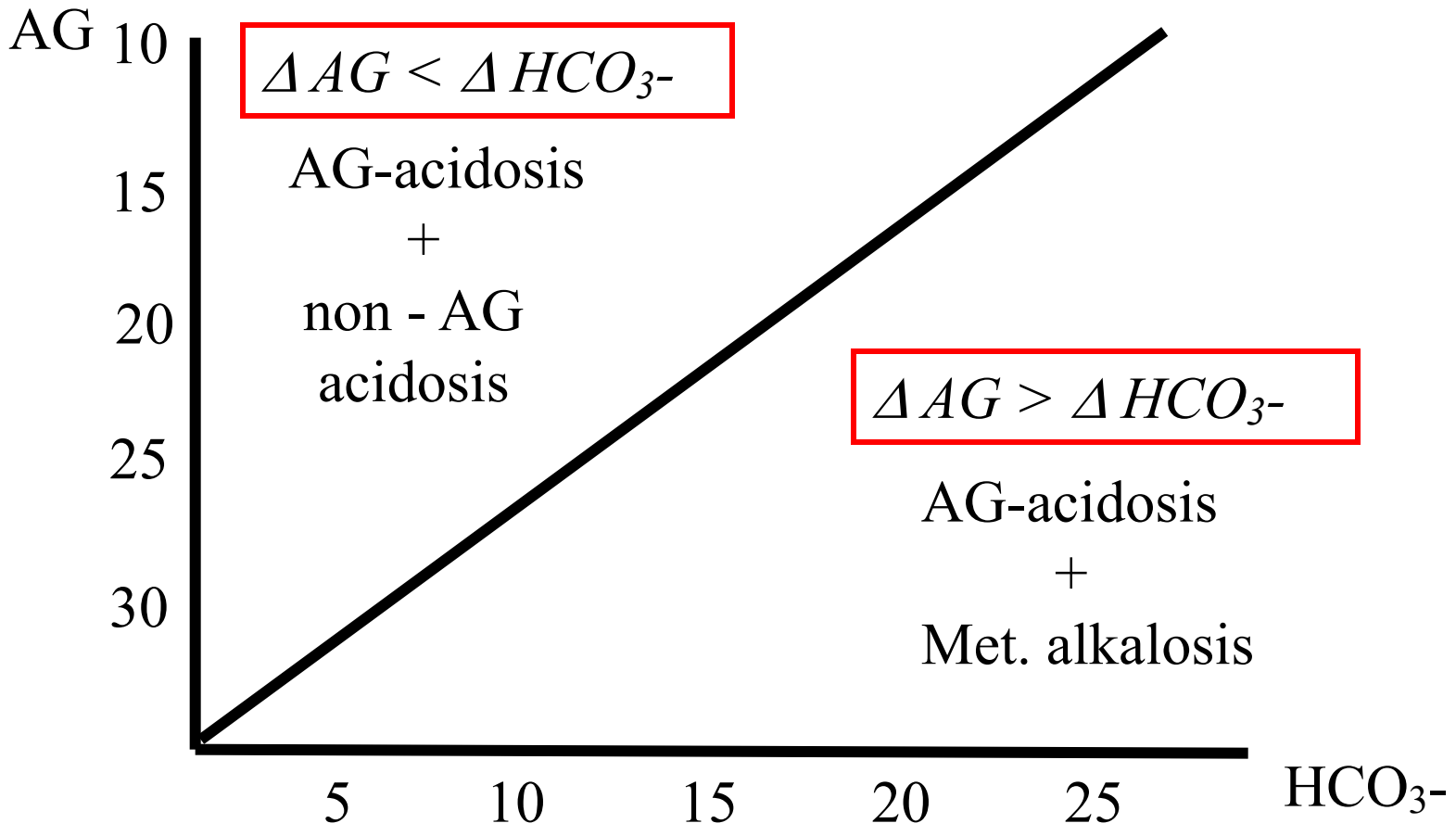
**$K^+$ = 5,2 mEq/L**

Anion gap: $Na^+ - (Cl^- + HCO_3) = 48$ ( n.v. 8-16)

**$\Delta$Anion gap** $= 48 - 12 = 36$

**$\Delta HCO_3$** $= 24 - 5,5 = 18,5$

# Δ AG / Δ $HCO_3$- (Δ / Δ)


AG
10
15
20
25
30
Δ AG < Δ HCO3-
AG-acidosis
+
non - AG
acidosis
Δ AG > Δ HCO3-
AG-acidosis
+
Met. alkalosis
5
10
15
20
25
HCO3-

# Valori decisionali del rapporto $\Delta AG/\Delta HCO^-_3$

| | |
|---|---|
| **< 0.4** | AM ipercloremica |
| **0.4 – 0.8** | AM ipercloremica + AM-Ag |
| **> 0.8 – 2** | AM-Ag |
| **> 2** | AM-Ag + Alcalosi metabolica |

# Case 3

- **ABG's**

pH = 6,92

$PO_2$ = 90,6 mmHg

$PCO_2$ = 27,6 mmHg

$HCO_3$ = 5,5 mEq/L

- **Electrolytes**

$Na^+$ = 140 mEq/L

$Cl^-$ = 87 mEq/L

$K^+$ = 5,2 mEq/L

($PCO_2$ <1,2 *if* $HCO_3$ < 1)

Expected $PCO_2$ = 17,8

Actual $PCO_2$ - Epected $PCO_2$ = 9,8

# Case 3

- **ABG's**

pH = 6,92

$PO_2$ = 90,6 mmHg

$PCO_2$ = 27,6 mmHg

$HCO_3$ = 5,5 mEq/L

- **Electrolytes**

$Na^+$ = 140 mEq/L

$Cl^-$ = 87 mEq/L

$K^+$ = 5,2 mEq/L

**AG metabolic acidosis**
**Metabolic alkalosis**
**Respiratory acidosis**

# Report interpretation

***What about this case ?***

- An acid pH (even if very acid) does not exclude the presence of alkalosis
- A reduced $PCO_2$ does not mean absence of ventilation problems (attention to the expected compensatory values )
- As always a reduced serum chloride concentration is a good marker

# Case 4

An 81- year- old woman arrives to the ER because of fever and soft tissue infection

**History :** Hypertension . PM implantation (three years before)

**Vital signs :** BP 80 /?mmHg; HR 60 bpm; RR 32 bpm; T 38.2°C; $SaO_2$ 92 %.

**Physical exam :** Chest: bilateral inspiratory crackles

**Laboratory tests :**

- Leucocytes 19.000, INR 13, Creatinine 2,4 mg/dL, Bilirubin 2,3 mg/dL, CRP 33 mg/dL

**Chest X-ray:** Upper zone vascular redistribution. **ECG:** PM rhythm

# Case 4

- **ABG's**

**pH = 7,44**

**$PO_2$ = 61 mmHg**

**$PCO_2$ = 30 mmHg**

**$HCO_3$ = 21 mEq/L**

- **Electrolytes**

**$Na^+$ = 131 mEq/L**

**$Cl^-$ = 97 mEq/L**

**$K^+$ = 3,9 mEq/L**

**Lactate = 6,1 mmol/L**

Anion gap: $Na^+ - (Cl^- + HCO_3) = 14$ ( n.v. 8-16)

Chronic respiratory alkalosis

# Case 4

- **ABG's**

pH = 7,44

$PO_2$ = 61 mmHg

$PCO_2$ = 30 mmHg

$HCO_3$ = 21 mEq/L

- **Electrolytes**

$Na^+$ = 131 mEq/L

$Cl^-$ = 97 mEq/L

$K^+$ = 3,9 mEq/L

Lactate = 6,1 mmol/L

Albumin 2,3 g/dL

# HUMAN ALBUMIN

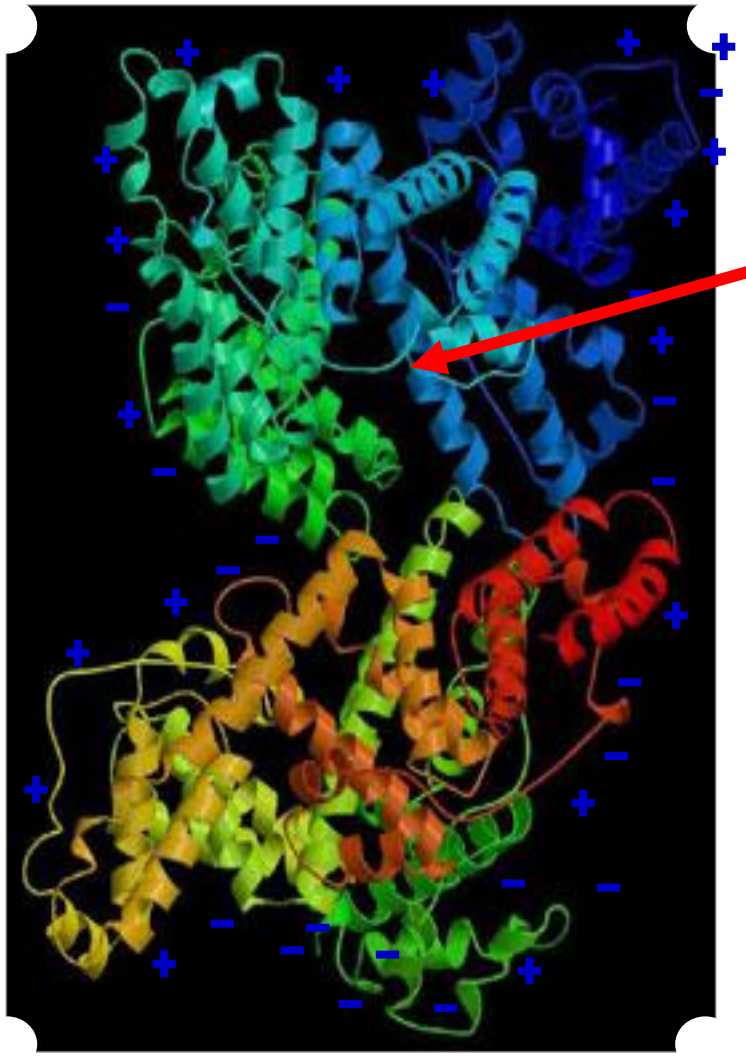
## Net Na-Albumin

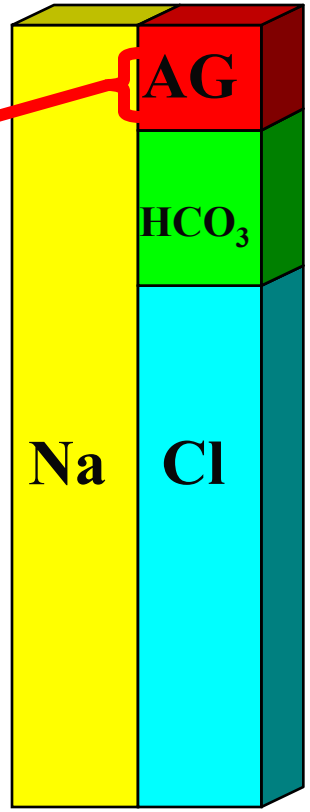
At pH = 7.4
about net 22 negative charges

MW = 66,500 mg/mm
1 gm% = 0.154 mm/l
= 3.3 mEq/l

For each 1 gm% fall in albumin the AG falls About 2.5 mEq/l

AG adjusted =
AG + 2.5 (4.5-observed Alb)





# Case 4

- **ABG's**

pH = 7,44

$PO_2$ = 61 mmHg

$PCO_2$ = 30 mmHg

$HCO_3$ = 21 mEq/L

- **Electrolytes**

$Na^+$ = 131 mEqI

$Cl^-$ = 97 mEq/L

$K^+$ = 3,9 mEq/L

Lactate = 6,1 mmol/L

Albumin 2,3 g/dL

Anion gap: $Na^+ - (Cl^- + HCO_3)$ = 19 ( n.v. 8-16)

AG metabolic acidosis and respiratory alkalosis

# Report interpretation

***What about this case ?***

- In the critical patient the anion gap should be evaluated knowing the serum albumin
- Measure the serum lactate concentration, if possible

# Case 6

A 44-year-old woman came to the ED because of sore throat and drowsiness .

**History:** She suffers from depression. No medication.

**Vital signs :** BP 125/80mmHg; HR 86 bpm; RR 20 bpm; T 36.2°C; $SaO_2$ 95 %; GCS 14.

**Physical exam :** Normal

**Chest X-ray:** No pathological findings. **ECG:** sinus rhythm

# Case 6

- **ABG's**

**pH = 7,30**

**$PO_2$ = 88 mmHg**

**$PCO_2$ = 34,6 mmHg**

**$HCO_3$ = 16,6 mEq/L**

- **Electrolytes**

**$Na^+$ = 149 mEq/L**

**$Cl^-$ = 111 mEq/L**

**$K^+$ = 3,6 mEq/L**

**Lactate = 6,2 mmol/L**

Anion gap: $Na^+ - (Cl^- + HCO_3) = 21$ ( n.v. 8-16)

# Case 6

- **ABG's**

pH = 7,30

$PO_2$ = 88 mmHg

$PCO_2$ = 34,6 mmHg

$HCO_3$ = 16 mEq/L

- **Electrolytes**

$Na^+$ = 149 mEq/L

$Cl^-$ = 111 mEq/L

$K^+$ = 3,6 mEq/L

Lactate = 6,2 mmol/L

($PCO_2$ <1,2 *if* $HCO_3$ < 1)

Expected $PCO_2$ = 30,4

Actual $PCO_2$ - Epected $PCO_2$ = 4,2

# Case 6

- **ABG's**

**pH = 7,30**

**$PO_2$ = 88 mmHg**

**$PCO_2$ = 34,6 mmHg**

**$HCO_3$ = 16,6 mEq/L**

- **Electrolytes**

**$Na^+$ = 149 mEq/L**

**$Cl^-$ = 111 mEq/L**

**$K^+$ = 3,6 mEq/L**

**Lactate = 6,2 mmol/L**

Anion gap: $Na^+ - (Cl^- + HCO_3) = 21$ ( n.v. 8-16)

Metabolic acidosis and respiratory acidosis

# Case 6

**Laboratory** test : Creatinine 0,4 mg/dL

Hb 11g/dL

Urine Ketones +++

Blood glucose 43 mg/dL

Alcohol 257 mg/dL

# Case 6

**Metabolic Acidosis**

**with high Anion Gap and increased urinary ketone bodies**

**+**

**Hypoglycemia**

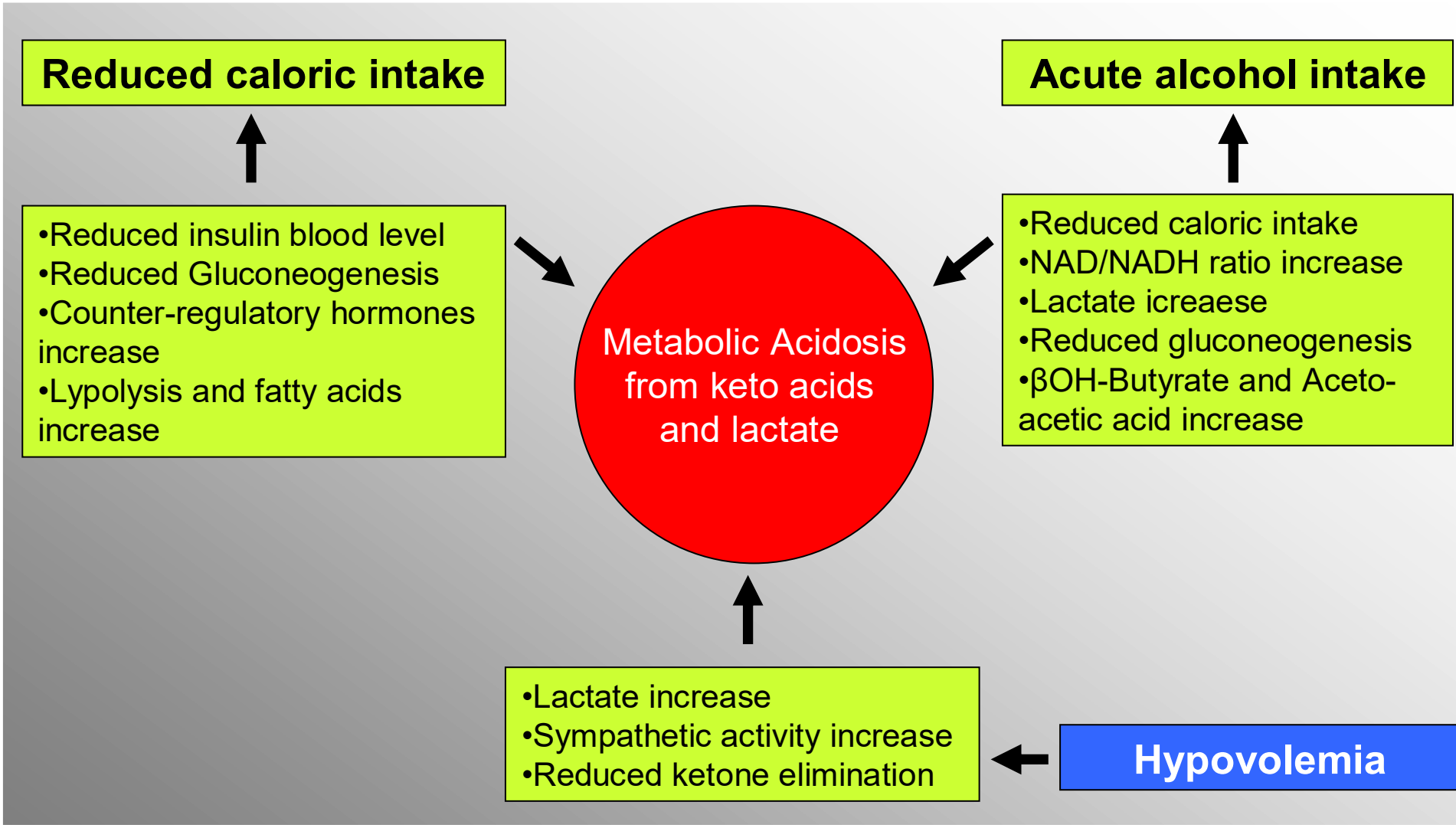
**+**

**Acute alcohol intake**

**in patient without recent alcohol abuse**

**ALCOHOLIC KETOACIDOSIS**

# Case 6


Reduced caloric intake
•Reduced insulin blood level
•Reduced Gluconeogenesis
•Counter-regulatory hormones increase
•Lypolysis and fatty acids increase
Acute alcohol intake
•Reduced caloric intake
•NAD/NADH ratio increase
•Lactate icreaese
•Reduced gluconeogenesis
•βOH-Butyrate and Aceto-acetic acid increase
Metabolic Acidosis from keto acids and lactate
•Lactate increase
•Sympathetic activity increase
•Reduced ketone elimination
Hypovolemia

# Report interpretation

***What about this case ?***

- Do not stop at the first evaluation
- Always collect a careful history
- Always calculate AG
- Think of all causes of AG anion gap acidosis

# Caso 7

# Anamnesi

APR, paziente di 67 anni, con storia di:

- infezione da Ossiuri in età infantile

- 2008 intervento chirurgico per ascesso peri-anale

- 2009 colecistectomia per litiasi

- pregressi interventi per ernie inguinali (bilateralmente)

- 2012 riferisce visita cardiologica, eseguita per sensazione di peso epigastrico, con indicazione a TNT sub linguale in caso di precordialgia, ma non eseguiti ulteriori accertamenti né prescritta terapia

- voluminosa ernia discale L4-L5 (recente RM in visione), già valutata dal NCH con indicazione a terapia antalgica

Nega terapia domiciliare in cronico.

Riferita allergia ad ASA.

# Anamnesi

APP, in data 28/03/2016 h 5:30, giunge in DEA per:

- episodio pre-sincopale avvenuto dopo essersi alzato per andare in bagno, riportando trauma cranico a livello dell'arcata sopraccigliare sinistra nega franca perdita di conoscenza pre e post trauma
- diarrea da molti giorni (3-4 scariche al dì, feci acquose non ematiche), inappetenza da 3 gg, nega febbre;
- lombalgia destra irradiata fino a livello popliteo da circa 20 giorni (per cui ha eseguita l'RM mostrante l'ernia discale L4-L5)

Negli ultimi 7-10 giorni, su indicazione del Curante, ha assunto dapprima Diclofenac e Tiocolchiside, poi Betametasone 1 fim x 2 die, Lansorpazolo 15 mg, Ossicodone/Naloxone 10/5 mg die (quest'ultimo sospeso da 2-3 giorni perché la lombalgia si è attenuata).

# Parametri ed obiettività

PA 120/80 mm Hg, FC 96 bpm RS, $SatO_2$ 97% aa

Apiretico

Disidratazione di cute e mucose

Vigile ma piuttosto rallentato, collaborante e congruo

EOC attività cardiaca ritmica

EOT MV bilaterale

EOA addome trattabile, globoso

Non edemi declivi o periferici

Non deficit sensitivo-motori, non segni di lato

# Accertamenti

**ECG**

Ritmo sinusale. Presenza di onde U.

**RX torace**

Non lesioni pleuro-parenchimali

**TC cranio**

Non lesioni acute ischemiche né emorragiche

# Case 6

- **ABG's**

**pH = 7,49**

**$PO_2$ = 116 mmHg**

**$PCO_2$ = 19,6 mmHg**

**$HCO_3$ = 14,8 mEq/L**

- **Electrolytes**

**$Na^+$ = 116 mEq/L**

**$Cl^-$ = 66 mEq/L**

**$K^+$ = 2,9 mEq/L**

**Lactate = 6,4 mmol/L**

Anion gap: $Na^+ - (Cl^- + HCO_3) = 34$ ( n.v. 8-16)

# Esami ematici

Hb 18.7 g/dL

Leucociti 23.19 x 1000/mcL (Neutr 90.1%)

Prot C reatt 0.19 mg/dL

**Creat 6.13 mg/dL**

Glucosio 279 mg/dL

Bil tot 2.16 mg/dL (1.44 indiretta)

Albumina 5.4 g/dL (v.n. 3.2-5.5)

Na/Cl = 1,75

# Case 6

- **ABG's**

**pH = 7,49**

**$PO_2$ = 116 mmHg**

**$PCO_2$ = 19,6 mmHg**

**$HCO_3$ = 14,8 mEq/L**

- **Electrolytes**

**$Na^+$ = 116 mEq/L**

**$Cl^-$ = 66 mEq/L**

**$K^+$ = 2,9 mEq/L**

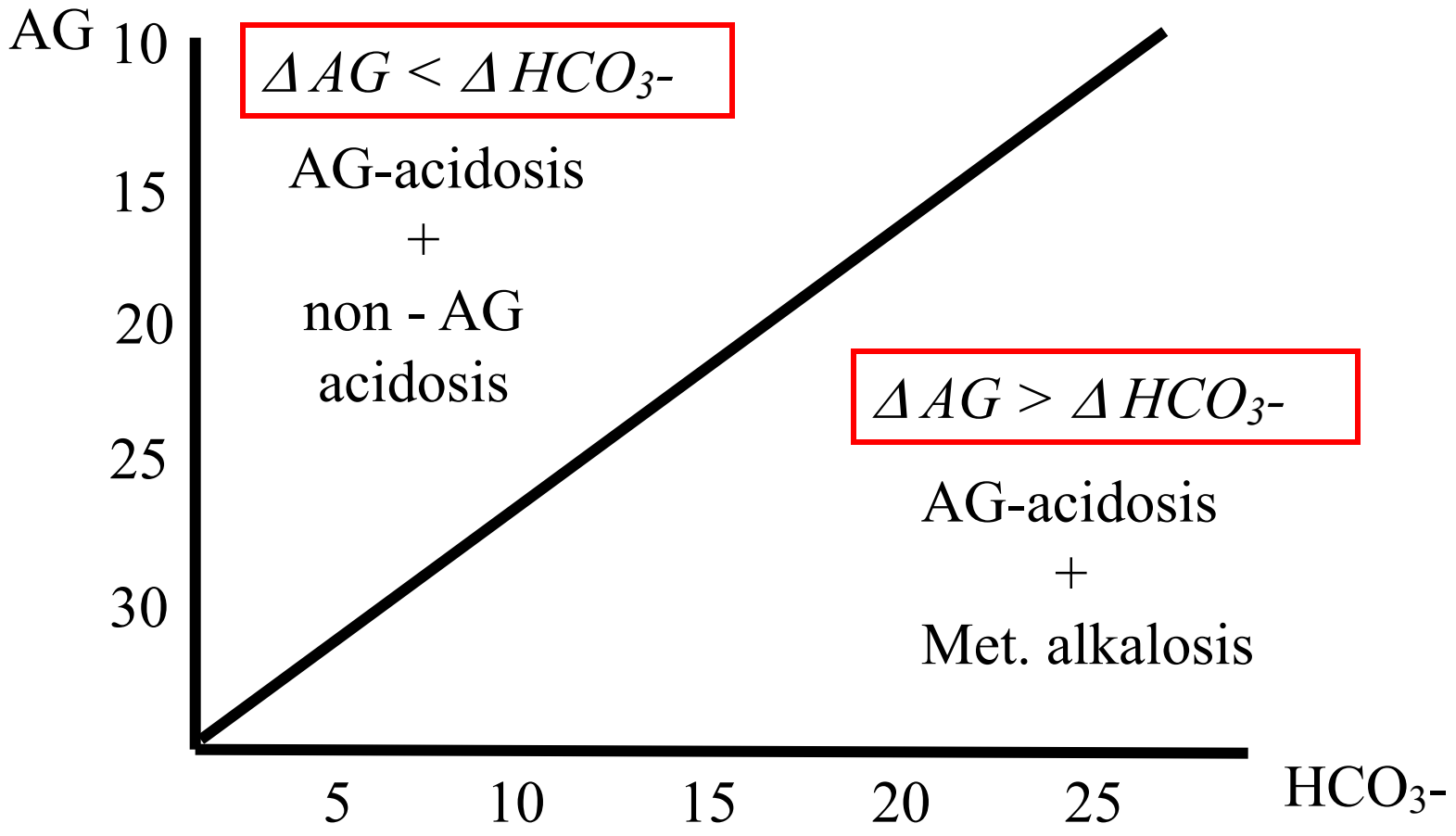
**Lactate = 6,4 mmol/L**

Anion gap: $Na^+ - (Cl^- + HCO_3) = 34$ ( n.v. 8-16)

**$\Delta HCO_3$** 24 – 14,8 = 9,2

**ΔAnion gap** 34,6-12 = 22,6

# Δ AG / Δ $HCO_3$- (Δ / Δ)


AG
10
15
20
25
30
Δ AG < Δ HCO3-
AG-acidosis
+
non - AG
acidosis
Δ AG > Δ HCO3-
AG-acidosis
+
Met. alkalosis
5
10
15
20
25
HCO3-

# Valori decisionali del rapporto $\Delta AG/\Delta HCO^-_3$

| | |
|---|---|
| **< 0.4** | AM ipercloremica |
| **0.4 – 0.8** | AM ipercloremica + AM-Ag |
| **> 0.8 – 2** | AM-Ag |
| **> 2** | AM-Ag + Alcalosi metabolica |

# Case 6

- **ABG's**

pH = 7,49

$PO_2$ = 116 mmHg

$PCO_2$ = 19,6 mmHg

$HCO_3$ = 14,8 mEq/L

- **Electrolytes**

$Na^+$ = 116 mEq/L

$Cl^-$ = 66 mEq/L

$K^+$ = 2,9 mEq/L

Lactate = 6,4 mmol/L

($PCO_2$ <1,2 *if* $HCO_3$ < 1)

Expected $PCO_2$ = 29,2

Actual $PCO_2$ - Expected $PCO_2$ = 9,6

# Case 6

- **ABG's**

pH = 7,49

$PO_2$ = 116 mmHg

$PCO_2$ = 19,6 mmHg

$HCO_3$ = 14,8 mEq/L

- **Electrolyte**

$Na^+$ = 116 mEq/L

$Cl^-$ = 66 mEq/L

$K^+$ = 2,9 mEq/L

Lactate = 6,4 mmol/L

**Acidosi metabolica AG**
**Alcalosi metabolica**
**Alcalosi respiratoria**

# Ricovero

Dopo opportuna idratazione, sia la creatinina che gli elettroliti si sono normalizzati; scomparsa la sintomatologia di ingresso in PS.

Colonscopia: “polipo del retto-sigma” e diverticolosi.

Istologico: adenoma tubulo-villoso displastico

(displasia di basso grado con campo di displasia ad alto grado).

In attesa di intervento chirurgico

# Adenoma tubulo-villoso

Spesso asintomatico, può dare:

- rettorragia
- crampi e dolore addominale
- sintomi da ostruzione se di grandi dimensioni
- **diarrea acquosa con ipokaliemia**

La terapia consiste nella resezione endoscopica o chirurgica.

# The Mckittrick-Wheelock Syndrome: A Rare Cause of Severe Hydroelectrolyte Disorders and Acute Renal Failure

**The rare McKittrick-Wheelock Syndrome , first described in 1954, is characterized by severe fluid and electrolyte depletion secondary to mucous diarrhea from rectal tumors, most notably villous adenoma.**

**The mucous hypersecretion from villous adenoma causes dehydration, hyponatremia, hypokalemia and hypocloremia**

**Daily losses can amount from 1,5 to 3,5 L of fluid containing 40-160 mmol/L sodium, 15-105 mmol/L potassium and 80 – 165 mmol/L di chloride**

**The mechanism of fluid and electrolyte loss is unclear: local release of prostaglandin E2 has been suggested as the secretagogue responsible for salt wasting**