

ABB/Questions and Case Studies

Questions

1 The concentration of hydrogen ions (H^+) in body fluids is in the order of:

- A - $\mu\text{mol/l}$
- B - nmol/l
- C - mmol/l
- D - pmol/l

2 The urinary excretion of H^+ in 24 h in an adult is on average around the value:

- A - 200 mmol
- B - 40 μmol
- C - 70 mmol
- D - 7 mmol/l

3 The serum buffer bases are given by the values:

- A - $[\text{HCO}_3^-] + [\text{Proteinate}]$
- B - $[\text{Cl}^-] + [\text{HCO}_3^-] + [\text{HPO}_4^{2-}] + [\text{lactate}]$
- C - $[\text{HCO}_3^-] + [\text{CO}_3^{2-}]$

4 Recognition of metabolic acidosis (MAC) in mixed ABR disorder allows:

- A - finding of elevated "anion gap" values
- B - decrease in pO_2 in arterial or central venous blood
- C - low haemoglobin in the blood
- D - increased blood lactate

5 Significant hypoproteinemia with a decrease in residual anions leads to:

- A - MAL
- B - MAC
- C - RAL + MAC
- D - MAC + RAC

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Case Studies

Patient with scoliosis and cardiac defect

A 17-year-old patient admitted to the hospital with congestive heart defect and scoliosis. Laboratory investigated on admission and again 24 h later.

Urine:

- Proteins 1 g
- pH = 6
- 3-6 hyaline cylinders
- other findings normal

Laboratory results

	on admission	after 24 h
pH	7,2	7,46
pCO ₂	14,0 kPa	5,3 kPa
HCO ₃ ⁻	40 mmol/l	29 mmol/l
BE	5,0 mmol/l	5,0 mmol/l
pO ₂	17,6 kPa	17,6 kPa
saturace O ₂	97,90 %	99 %
Na ⁺	146 mmol/l	139 mmol/l
K ⁺	5,0 mmol/l	3,3 mmol/l
Cl ⁻	94 mmol/l	96 mmol/l
glycemia	6,9 mmol/l	4,8 mmol/l
urea	6,0 mmol/l	1,7 mmol/l
creatinine	45 μmol/l	75 μmol/l
CK	3,6 μkat/l	2,4 μkat/l
LD	4,1 μkat/l	3,8 μkat/l
Hb	189 g/l	165 g/l
hematocrit	58,80 %	50,70 %

Questions:

1. What was the ABB disorder on admission?
2. What was the ABB impairment after 24 h?
3. What was the cause of the decrease in serum K⁺ over 24 h?
4. Does the clinical status correspond to the laboratory findings?

Answers

Patient in acute respiratory distress

A 51-year-old man admitted to hospital with acute respiratory distress syndrome (ARDS). The patient smokes 3 packs of cigarettes a day.

Laboratory results on admission

pH	7,41
pCO ₂	5,4 kPa
HCO ₃ ⁻	26,0 mmol/l
pO ₂	17,6 kPa
saturation O ₂	76 %
carbonylHb	11,50 %
venous saturation	54 %
P ₅₀	4,33 kPa
2,3-bisphosphoglycerate	5,3 j. (norma 3,3-5,3)
Hb	201 g/l

Questions:

1. How do you rate ABB at the time of patient admission?
2. Is the oxyhemoglobin dissociation curve shifted?
3. What is the significance of the other results?

Answers

Patient in diabetic coma

A 15-year-old girl is brought to the E.R. in a coma. She's been diabetic for 7 years, taking insulin. She's had several bouts of hypoglycemia and ketoacidosis. She has had a lot of studying at school recently and may have neglected some insulin injections.

Laboratory results on admission

	blood	urine	
pH	7,11	ketonuria	3
pCO ₂	2,7 kPa	glycosuria	3
HCO ₃ ⁻	8 mmol/l		
pO ₂	12,7 kPa		
saturation O ₂	97,90 %		
glycemia	58,3 mmol/l		
Na ⁺	148 mmol/l		
K ⁺	5,8 mmol/l		
Cl ⁻	87 mmol/l		
lactate			
urea	5 mmol/l		
creatinin	122 μmol/l		
osmolality	385 mmol/kg		
calculated osmolarity	346 mmol/l		
anion gap	58,3 mmol/l		

Questions:

1. **What is the diagnosis?**
2. **Calculate the anion gap (AG), what is the cause of the high AG?**
3. **What is the significance of the increased osmolality?**
4. **Why are chloride and HCO₃⁻ decreased, what is the significance of "normal" Na⁺ and increased K⁺?**

Answers

Patient with pulmonary insufficiency and hypokalemia

Patient 55 years old, with chronic obstructive pulmonary disease, who was treated for a long time with thiazide preparations (as a diuretic).

Laboratory results on admission

pH	7,42
pCO ₂	11,6 kPa
HCO ₃ ⁻	55 mmol/l
pO ₂	8,4 kPa
K ⁺	2,6 mmol/l

Questions:

1. **What is the fault in ABB?**

Answers

Links

Related Article

- ABB
- Disorders of acid-base balance
- Diabetic ketoacidosis
- Oxygen transport through the blood