

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
- $\text{pH} = 6$
- 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
saturation 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 %
carboxyHb	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