



Acid-Base Balance 3

Acid Base Disorders

1. A 50-year-old homeless man was brought to the emergency room in a stuporous state. Blood pressure is 100/50 mmHg, heart rate 120 beats/min, respiratory rate 35/min, and his temperature is 104F (40C). He was found to have cellulitis of his left foot. Below are his lab results: Sodium 150mEq/L (135-145), Potassium 2.5mEq/L (3.5-5.0), Chloride 107mEq/L (95-105), Bicarbonate 10mEq/L (24-26), pH 7.2 (7.35-7.45), PCO₂ 25mmHg (35-45), Alcohol 40mmol/L (0), Osmolality 370mOsm/L (280-295), Glucose 50mg/dl (60-110) BUN 40mg/dl (5-22). What is the acid-base status?

- a. *metabolic acidosis and metabolic alkalosis*
- b. *metabolic acidosis with partial respiratory compensation*
- c. *respiratory acidosis and partial metabolic compensation*
- d. *respiratory acidosis*

2. The medical student next to you, realizing that there is an examination question on acid base balance, begins nervously hyperventilating and then faints. You make him breathe into a paper bag and he recovers. If you had drawn and analysed his blood when he fainted you would have expected to see :

- a. *decreased pH, decreased pCO₂*
- b. *decreased pH, decreased pCO₂*
- c. *elevated pH, decreased pCO₂*
- d. *elevated pH, elevated pCO₂*

3. A hospital patient with AIDS has large amount of diarrhea over the past 4 hours. He becomes hypovolemic over a short period of time. Which of the following lab results would best fit this clinical history?

- a. *pH: 7.15, pCO₂: 55 mmHg, HCO₃: 40 mEq/L*
- b. *pH: 7.25, pCO₂: 36 mmHg, HCO₃: 15 mEq/L*
- c. *pH: 7.40, pCO₂: 40 mmHg, HCO₃: 24 mEq/L*
- d. *pH: 7.50, pCO₂: 28 mmHg, HCO₃: 24 mEq/L*

4. A 28-year-old man with bronchiectasis presents to the hospital emergency room with 3 days of increasing cough, sputum, and dyspnea despite maximizing his bronchodilators. About 1 month ago, an outpatient stable room arterial blood gas showed pH 7.38, PaO₂ 55 mmHg, PaCO₂ 65 mmHg, and HCO₃- 32 mEq/L. His current vital signs are BP 117/65 mmHg, P 123/min, T 100°F. His room air ABG in the ER is pH 7.28, PaCO₂ 70 mmHg, PaO₂ 50 mmHg, and HCO₃- 23 mEq/L. Which of the following best characterizes the current acid-base status?

- a. *compensated metabolic acidosis*
- b. *compensated metabolic alkalosis*
- c. *uncompensated metabolic acidosis*
- d. *uncompensated respiratory acidosis*

5. In a man undergoing surgery, it was necessary to aspirate the contents of the upper gastro-intestinal tract. After surgery, the following values were obtained from an arterial blood sample: pH 7.55, PCO₂ 52 mm Hg and HCO₃⁻ 40 mmol/l. What is the underlying disorder?

- a) *Metabolic acidosis*
- b) *Respiratory alkalosis*
- c) *Metabolic alkalosis*
- d) *Respiratory acidosis*

6. A person was admitted to hospital in a coma. Analysis of the arterial blood gave the following values: PCO₂ 16 mm Hg, HCO₃⁻ 5 mmol/l and pH 7.1. What is the underlying acid-base disorder?

- a) *Metabolic acidosis*
- b) *Respiratory alkalosis*
- c) *Metabolic alkalosis*
- d) *Respiratory acidosis*

7. A climber attempts an assault on a high mountain in the Andes and reaches an altitude of 5000 meters (16,400 ft) above sea level. What will happen to his arterial PCO₂ and pH?

- a) *Both will be lower than normal.*
- b) *The pH will rise and PCO₂ will fall.*
- c) *Both will be higher than normal due to the physical exertion.*
- d) *The pH will fall and PCO₂ will rise*

8. A young woman is found comatose, having taken an unknown number of sleeping pills an unknown time before. An arterial blood sample yields the following values: pH – 6.90, HCO₃⁻ 13 meq/liter, PaCO₂ 68 mmHg. This patient's acid-base status is most accurately described as

- a) *Uncompensated metabolic acidosis*
- b) *uncompensated respiratory acidosis*
- c) *simultaneous respiratory and metabolic acidosis*
- d) *respiratory acidosis with partial renal compensation*

9. A 45- year-old female with renal failure, missed her dialysis and was feeling sick, what could be the reason ?

- a) *Metabolic Acidosis*
- b) *Metabolic Alkalosis*
- c) *Respiratory Acidosis*
- d) *Respiratory Alkalosis*

10. An 80-year-old man had a bad cold. After two weeks he said, “It went in to my chest, I am feeling tightness in my chest, I am coughing, suffocated and unable to breathe!” What could be the possible reason?

- a) *Metabolic Acidosis*
- b) *Metabolic Alkalosis*
- c) *Respiratory Acidosis*
- d) *Respiratory Alkalosis*

11. A post operative surgical patient had a naso gastric tube in for three days. The nurse caring for the patient stated that there was much drainage from the tube that is why she felt so sick. What could be the reason?

- a) *Metabolic Acidosis*
- b) *Metabolic Alkalosis*
- c) *Respiratory Acidosis*
- d) *Respiratory Alkalosis*

12. Which of the following laboratory results below indicates compensated metabolic alkalosis?

- a) *Low p CO₂, normal bicarbonate and, high pH*
- b) *Low p CO₂, low bicarbonate, low pH*
- c) *High p CO₂, normal bicarbonate and, low p H*
- d) *High pCO₂, high bicarbonate and High pH*

13. Which of the following is most appropriate for a female suffering from Insulin dependent diabetes mellitus with a pH of 7.2, HCO₃-17 mmol/L and pCO₂-20 mm HG

- a) *Metabolic Acidosis*
- b) *Metabolic Alkalosis*
- c) *Respiratory Acidosis*
- d) *Respiratory Alkalosis*

14. Causes of metabolic alkalosis include all the following except.

- a) *Mineralocorticoid deficiency.*
- b) *Hypokalemia*
- c) *Thiazide diuretic therapy.*
- d) *Recurrent vomiting.*

15. Which out of the following conditions will not cause respiratory alkalosis?

- a) *Fever*
- b) *Anxiety*
- c) *Laryngeal obstruction*
- d) *Salicylate toxicity*

Questions From The Lecture :

16. A 50 year-old man with history of type 2 diabetes was admitted to the emergency department with history of polyuria. On examination he had rapid and deep breathing. Blood analysis showed glucose level of 400 mg/dl.

The following is the arterial blood analysis report of this patient:

- **pH = 7.1, PCO₂ = 40 mmHg and HCO₃⁻ = 18 mmol/L**
- **(Normal reference ranges: PCO₂ = 36.0-46.0 mmHg, HCO₃⁻ = 22.0-26.0 mmol/L)**
- **What is the acid base disturbance in this case?**

17. PH= 7.12, PaCO₂= 60mmHg, HCO₃⁻ = 24meq/L.

- a) *Compensated metabolic acidosis.*
- b) *Uncompensated metabolic acidosis,*
- c) *Compensated respiratory acidosis,*
- d) *Uncompensated respiratory acidosis*

18. PH= 7.51, PaCO₂= 40mmHg, HCO₃⁻ = 31meq/L.

- a) *Normal,*
- b) *Compensated respiratory acidosis,*
- c) *Uncompensated respiratory alkalosis.*
- d) *Uncompensated metabolic alkalosis,*

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
b	c	b	d	c	a	b	c	a	c	b	d	a	a	c

16	17	18
Metabolic Acidosis	d	d

LINKS FOR EXTRA QUESTIONS

- ✓ <http://fcpspretest.com/acid-base-balance-physiology/>
- ✓ <http://fcpspretest.com/renal-physiology-mcqs/>
- ✓ http://fac.ksu.edu.sa/sites/default/files/Questions_and_answers_3.pdf
- ✓ <http://www.acbrown.com/kidney/Instructions/RnPQst.htm>