

## Chapter 02: Fluid, Electrolyte, and Acid-Base Imbalances

### VanMeter and Hubert: Gould's Pathophysiology for the Health Professions, 7th Edition

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#### MULTIPLE CHOICE

1. Choose the correct proportion of water to body weight to be expected in a healthy male adult's body:
  - a. 30%
  - b. 45%
  - c. 60%
  - d. 70%

ANS: C

2. Choose the correct proportion of blood (to body weight) in an adult male's body:
  - a. 30%
  - b. 20%
  - c. 10%
  - d. 4%

ANS: D

3. Which of the following is NOT part of the extracellular fluid compartment (ECF)?
  - a. Blood
  - b. Cytoplasm
  - c. Cerebrospinal fluid
  - d. Transcellular fluid

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ANS: B

4. Insensible fluid loss refers to water lost through
  - a. perspiration only.
  - b. feces only.
  - c. perspiration and expiration.
  - d. urine and feces.

ANS: C

5. The osmoreceptor cells controlling the thirst mechanism are located in the
  - a. medulla oblongata.
  - b. thalamus.
  - c. epithalamus.
  - d. hypothalamus.

ANS: D

6. When the osmotic pressure of the blood is elevated above normal, water would shift from the
  - a. blood into the cells.
  - b. interstitial compartment into the cells.
  - c. interstitial compartment into the blood.

- d. cells into the interstitial compartment.

ANS: C

7. Which of the following would result from a deficit of plasma proteins?
- a. Increased osmotic pressure
  - b. Decreased osmotic pressure
  - c. Increased hydrostatic pressure
  - d. Decreased hydrostatic pressure

ANS: B

8. Which of the following would cause edema?
- a. Decreased capillary hydrostatic pressure
  - b. Increased capillary osmotic pressure
  - c. Decreased capillary permeability
  - d. Increased capillary permeability

ANS: D

9. Which of the following would likely be related to an elevated hematocrit reading?
- a. Fluid excess
  - b. Fluid deficit
  - c. Increased sodium level
  - d. Decreased erythrocytes

ANS: B

10. Which of the following is a typical sign of dehydration?
- a. Rapid, strong pulse
  - b. Low hematocrit
  - c. Increased urine output
  - d. Rough oral mucosa

ANS: D

11. Which of the following terms refers to a combination of decreased circulating blood volume combined with excess fluid in a body cavity?
- a. Dehydration
  - b. Third-spacing
  - c. Hypovolemia
  - d. Water retention

ANS: B

12. Which of the following is the primary cation in the extracellular fluid?
- a. Sodium
  - b. Potassium
  - c. Calcium
  - d. Iron

ANS: A

13. Which of the following is a common cause of hyponatremia?
- Loss of the thirst mechanism
  - Excessive sweating
  - Excessive aldosterone secretion
  - Prolonged period of rapid, deep respirations

ANS: B

14. Which of the following is a common effect of both hypokalemia and hyperkalemia?
- Skeletal muscle twitch and cramps
  - Oliguria
  - Elevated serum pH
  - Cardiac arrhythmias

ANS: D

15. Choose the correct effect of increased parathyroid hormone.
- Increased movement of calcium ions into the bones
  - Increased activation of vitamin D
  - Increased absorption of calcium from the digestive tract
  - Decreased reabsorption of calcium in the kidneys

ANS: C

16. Which of the following results from hypocalcemia?

- Low serum phosphate levels
  - Nausea and constipation
  - Skeletal muscle twitch and spasms
  - Weak cardiac contractions
- 1, 2
  - 1, 4
  - 2, 3
  - 3, 4

ANS: D

17. Which of the following causes tetany?
- Increased permeability of nerve membranes due to low serum calcium
  - Excess calcium ions in skeletal muscle due to excess parathyroid hormone (PTH)
  - Excess calcium ions inside somatic nerves as a result of neoplasms
  - Increased stimulation of the nerves in the cerebral cortex

ANS: A

18. Paresthesia is an effect of

- hyperkalemia.
- hypokalemia.
- hyponatremia.
- hypernatremia.

ANS: B

19. In which of the following processes is the phosphate ion NOT a major component?

- a. Bone metabolism
  - b. Metabolic processes involving adenosine triphosphate (ATP)
  - c. Blood clotting
  - d. Acid-base balance
- ANS: C
20. Which of the following would be considered normal serum pH?
- a. 4.5-8
  - b. 7.0
  - c. 7.4
  - d. 8
- ANS: C
21. When many excess hydrogen ions accumulate in the blood, what happens to serum pH? The pH
- a. decreases.
  - b. increases.
  - c. remains constant.
  - d. varies based on metabolism.
- ANS: A
22. What is the slowest but most effective control for acid-base balance?
- a. Respiratory system
  - b. Buffer systems in the blood
  - c. Kidneys
  - d. Brain
- ANS: C
23. Which of the following is essential in order to maintain serum pH within normal range?
- a. Carbonic acid and bicarbonate ion must be present in equal quantities.
  - b. All excess carbonic acid must be excreted by the kidneys.
  - c. The concentration of bicarbonate ion must remain constant.
  - d. The ratio of carbonic acid to bicarbonate ion must be 1:20.
- ANS: D
24. Which is the correct effect on the body of abnormally slow respirations?
- a. Increased carbonic acid
  - b. Decreased carbonic acid
  - c. Increased bicarbonate ion
  - d. Decreased bicarbonate ion
- ANS: A
25. Which condition is likely to cause metabolic acidosis?
- a. Slow, shallow respirations
  - b. Prolonged diarrhea
  - c. Mild vomiting
  - d. Excessive fluid in the body

ANS: B

26. What would a serum pH of 7.33 in a patient with kidney disease indicate?
- Metabolic alkalosis
  - Metabolic acidosis
  - Respiratory alkalosis
  - Respiratory acidosis

ANS: B

27. Which serum value indicates decompensated metabolic acidosis?
- pH is below normal range.
  - pH is above normal range.
  - Bicarbonate level decreases.
  - Bicarbonate level increases.

ANS: A

28. What is the effect on blood serum when excessive lactic acid accumulates in the body?
- Bicarbonate ion levels decrease.
  - Bicarbonate ion levels increase.
  - Carbonic acid levels increase.
  - pH increases.

ANS: A

29. The direct effects of acidosis are manifested primarily in the functioning of the
- digestive system.
  - urinary system.
  - nervous system.
  - respiratory system.

ANS: C

30. Compensation mechanisms in the body for dehydration would include
- increased antidiuretic hormone (ADH).
  - decreased aldosterone.
  - slow, strong heart contraction.
  - peripheral vasodilation.

ANS: A

31. Which acid-base imbalance results from impaired expiration due to emphysema?
- Metabolic acidosis
  - Metabolic alkalosis
  - Respiratory acidosis
  - Respiratory alkalosis

ANS: C

32. In patients with impaired expiration associated with emphysema, effective compensation for the acid-base imbalance would be

- a. increased rate and depth of respiration.
- b. decreased rate and depth of respiration.
- c. increased urine pH and decreased serum bicarbonate.
- d. decreased urine pH and increased serum bicarbonate.

ANS: D

33. An anxiety attack often causes hyperventilation leading to
- a. increased  $\text{PCO}_2$ .
  - b. decreased  $\text{PCO}_2$ .
  - c. respiratory acidosis.
  - d. metabolic acidosis.

ANS: B

34. One of the factors involved in the increased need for water in infants is
- a. proportionally smaller body surface area.
  - b. higher metabolic rate.
  - c. smaller respiratory capacity.
  - d. greater surface area of exposed mucous membranes.

ANS: B

35. Compensation for respiratory system depression due to anesthesia and sedation would be
- a. decreased reabsorption of bicarbonate ions in the kidneys.
  - b. increased secretion of hydrogen ions into the filtrate.
  - c. increased respiratory rate and depth.
  - d. increased renin secretion. [WWW.TBSM.WS](http://WWW.TBSM.WS)

ANS: B

36. A prolonged state of metabolic acidosis often leads to
- a. hypokalemia.
  - b. hyperkalemia.
  - c. hyponatremia.
  - d. hypercalcemia.

ANS: B

37. Strenuous physical exercise on a hot day is likely to result in
- a. hypokalemia.
  - b. hypernatremia.
  - c. hyperchloremia.
  - d. hypovolemia.

ANS: D

38. Place the following events in the correct sequence of events when ketoacids increase in the blood of a diabetic patient. Not all options are used in the answers.
1. Serum pH decreases
  2. Serum bicarbonate decreases
  3.  $\text{PCO}_2$  decreases
  4. Respiration decreases

- 5. Respiration increases
- 6. Serum pH increases
- 7. Urine pH decreases
- a. 1, 3, 7, 4, 2, 6
- b. 5, 2, 7, 3, 4, 1
- c. 2, 1, 5, 3, 7, 6
- d. 3, 1, 2, 5, 7, 6

ANS: C

39. Which of the following is a manifestation of respiratory alkalosis?
- a. Bradycardia and deep rapid breathing
  - b. Drowsiness and general lethargy
  - c. Increased nervous system irritability
  - d. Decreased urine pH

ANS: C

40. Prolonged diarrhea results in
- a. loss of fluid and bicarbonate ions, leading to metabolic acidosis.
  - b. increased fluid and serum bicarbonate ions, leading to metabolic acidosis.
  - c. loss of chloride ions only, leading to metabolic alkalosis.
  - d. surplus bicarbonate ions, leading to respiratory alkalosis.

ANS: A

41. In the initial stage, vomiting results in
- a. metabolic acidosis.
  - b. metabolic alkalosis.
  - c. respiratory alkalosis.
  - d. none of these.

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ANS: B

42. Which two ions are most important for acid-base balance in the body?
- a.  $K^+$ ,  $Na^+$
  - b.  $Cl^-$  and  $HCO_3^-$
  - c.  $Ca^{++}$ ,  $Na^+$
  - d.  $Na^+$ ,  $Cl^-$

ANS: B

43. The bicarbonate-carbonic acid buffer system helps maintain serum pH. The balance of the carbonic acid and bicarbonate ion levels are controlled by the
- a. liver and pancreas.
  - b. lungs and kidneys.
  - c. lungs and plasma proteins.
  - d. kidneys and bone marrow.

ANS: B

44. Alkalosis increases irritability and spontaneous stimulation of nerves by
- a. blocking normal nerve conduction.

- b. increasing the permeability of nerve membranes.
- c. blocking movement of calcium ions.
- d. decreasing phosphate ion levels.

ANS: B

45. Hypocalcemia causes weak cardiac contractions because
- a. permeability of nerve membranes increases.
  - b. insufficient calcium ions are available for muscle contraction.
  - c. low phosphate ion levels prevent muscle contraction.
  - d. excessive amounts of calcium are stored in cardiac muscle.

ANS: B

46. Serum potassium levels are affected by
- 1. ADH.
  - 2. aldosterone.
  - 3. serum  $H^+$  levels.
  - 4. insulin levels.
- a. 2 only
  - b. 1, 2
  - c. 1, 3
  - d. 2, 3, 4
  - e. 1, 2, 3

ANS: D

47. Which of the following is the primary control of serum  $Na^+$  levels?
- a. ADH
  - b. Aldosterone
  - c. Serum  $H^+$  levels
  - d. Serum  $K^+$  levels

ANS: B

48. The control center for thirst is located in the
- a. kidneys.
  - b. thalamus.
  - c. medulla.
  - d. hypothalamus.

ANS: D

49. Which statements apply to atrial natriuretic peptide?
- 1. It is secreted by heart muscle cells.
  - 2. It is a hormone secreted by the kidneys.
  - 3. It helps to control water and sodium balance.
  - 4. It is released in response to low blood pressure.
- a. 1, 3
  - b. 1, 4
  - c. 2, 3
  - d. 2, 4



ANS: A

50. What are the three mechanisms that control or compensate for serum pH?
- Hypothalamus, metabolic changes by digestive system, lymphatic system filtration
  - Buffer pairs in blood, change in kidney excretion rate, change in respiration rate
  - Neural feedback, increase in heart rate, decrease in calcium intake
  - Modification of water intake, increased capillary permeability, decrease in blood volume

ANS: B

51. Hypokalemia refers to a condition in which the serum has a very low level of which ion?
- Sodium
  - Phosphate
  - Calcium
  - Potassium

ANS: D

52. In the blood and extracellular fluids, hypernatremia refers to
- a deficient sodium level.
  - an excess phosphate level.
  - an excess sodium level.
  - an excessively low phosphate level.

ANS: C

53. Increased milk and/or antacid intake can contribute to development of "milk-alkali syndrome," which can cause which of the following?
- Hyponatremia
  - Hyperkalemia
  - Hypercalcemia
  - Hypovolemia

ANS: C

54. Ingested vitamin D must be activated in the
- liver.
  - kidney.
  - pancreas.
  - lung.

ANS: B

55. Neuromuscular hyperirritability may be a cause of
- hypomagnesemia.
  - hypermagnesemia.
  - hypophosphatemia.
  - hyperphosphatemia.

ANS: A

### Chapter 03: Introduction to Basic Pharmacology and Other Common Therapies

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#### MULTIPLE CHOICE

1. Documenting drug-induced responses of physiologic and biochemical systems is part of
- pharmacokinetics.
  - pharmacodynamics.
  - pharmacotherapeutics.
  - toxicology.

ANS: B

2. The study of the body's response to drugs, harmful effects, mechanisms of actions, symptoms, treatment, and identification is the role of
- pharmacokinetics.
  - pharmacodynamics.
  - pharmacotherapeutics.
  - toxicology.

ANS: C

3. Which of the following are considered to be the toxic effects of a drug?
- Additional, mild, unwanted effects
  - Unusual, unexpected mild effects
  - Serious, possibly life-threatening effects
  - Reduction of the allergic response

ANS: C

4. Dry mouth and drowsiness after the administration of an antihistamine is considered to be a(n)
- adverse effect.
  - toxic effect.
  - side effect.
  - hypersensitivity effect.

ANS: C

5. An unexpected or unusual response to a drug is called a(n)
- iatrogenic reaction.
  - teratogenic effect.
  - toxic effect.
  - idiosyncratic reaction.

ANS: D

6. A drug dose refers to
- the amount of a drug given at a single time.
  - the total amount of a drug given over a period of time.
  - the daily amount of a drug given.