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

   ANS: C

4. 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

5. 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

6. 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

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ANS: D

7. 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

8. 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

9. 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

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

    ANS: A

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

    ANS: B

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

    ANS: D

13. Choose the correct effect of increased parathyroid hormone.

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a. Increased movement of calcium ions into the bones
b. Increased activation of vitamin D
c. Increased absorption of calcium from the digestive tract
d. Decreased reabsorption of calcium in the kidneys

ANS: C

14. Which of the following results from hypocalcemia?
1. Low serum phosphate levels
2. Nausea and constipation
3. Skeletal muscle twitch and spasms
4. Weak cardiac contractions
a. 1, 2
b. 1, 4
c. 2, 3
d. 3, 4

ANS: D

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

ANS: A

16. In which of the following processes is 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

17. Which of the following would be considered normal serum pH?
a. 4.5-8
b. 7.0
c. 7.4
d. 8

ANS: C

18. 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

19. What is the slowest but most effective control for acid-base balance?

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a. Respiratory system
b. Buffer systems in the blood
c. Kidneys
d. Brain

ANS: C

20. 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

21. 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

22. 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

23. What would a serum pH of 7.33 in a patient with kidney disease indicate?
a. Metabolic alkalosis
b. Metabolic acidosis
c. Respiratory alkalosis
d. Respiratory acidosis

ANS: B

24. Which serum value indicates decompensated metabolic acidosis?
a. pH is below normal range
b. pH is above normal range
c. Bicarbonate level decreases
d. Bicarbonate level increases

ANS: A

25. What is the effect on blood serum when excessive lactic acid accumulates in the body?
a. Bicarbonate ion levels decrease
b. Bicarbonate ion levels increase
c. Carbonic acid levels increase
d. pH increases

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ANS: A

26. The direct effects of acidosis are manifested primarily in the functioning of the:
    a. Digestive system
    b. Urinary system
    c. Nervous system
    d. Respiratory system

    ANS: C

27. Compensation mechanisms in the body for dehydration would include:
    a. increased antidiuretic hormone (ADH).
    b. decreased aldosterone.
    c. slow, strong heart contraction.
    d. peripheral vasodilation.

    ANS: A

28. Which acid-base imbalance results from impaired expiration due to emphysema?
    a. Metabolic acidosis
    b. Metabolic alkalosis
    c. Respiratory acidosis
    d. Respiratory alkalosis

    ANS: C

29. 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

30. An anxiety attack often causes hyperventilation leading to:
    a. increased PCO_2.
    b. decreased PCO_2.
    c. respiratory acidosis.
    d. metabolic acidosis.

    ANS: B

31. 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

32. Compensation for respiratory system depression due to anesthesia and sedation would be:
    a. decreased reabsorption of bicarbonate ions in the kidneys.

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b. increased secretion of hydrogen ions into the filtrate.
c. increased respiratory rate and depth.
d. increased renin secretion.

ANS: B

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

ANS: B

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

ANS: D

35. 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. 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

36. 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

37. 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.

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ANS: A

38. In the initial stage, vomiting results in:
    a. metabolic acidosis.
    b. metabolic alkalosis.
    c. respiratory alkalosis.
    d. None of the above

    ANS: B

39. 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

40. 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

41. 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

42. 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

43. 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

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e. 1, 2, 3

ANS: D

44. 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

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

ANS: D

46. 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

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

ANS: B

48. Hypokalemia refers to a condition in which the serum has a very low level of which ion?
a. Sodium
b. Phosphate
c. Calcium
d. Potassium

ANS: D

49. In the blood and extracellular fluids, hypernatremia refers to:
a. a deficient sodium level.
b. an excess phosphate level.
c. an excess sodium level.

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d. an excessively low phosphate level.

ANS: C

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

ANS: C

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