

بسم الله الرحمن الرحيم



Test Bank - Source

‘MID FINAL’

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1.secretion of K by the distal tubule will be

decreased by

- (A) metabolic alkalosis
- (B) a high-K* diet
- (C) hyperaldosteronism
- (D) spironolactone administration
- (E) thiazide diuretic administration

Ans:d

2. Jared and Adam both weigh 70 kg: Jared drinks 2 L of distilled water, and Adam drinks 2 L of isotonic NaCl. As a result of these ingestions, Adam will have a

- (A) greater change in intracellular fluid (ICF) volume
- (B) higher positive free-water clearance
- (C) greater change in plasma osmolarity
- (D) higher urine osmolarity
- (E) higher urine flow rate

Ans:d

QUESTIONS 3 AND 4

A 45-year-old woman develops severe diarrhea while on vacation. She has the following arterial blood values:

pH = 7.25

PCO₂ = 24 mm Hg

[HCO₃⁻] = 10 mEq/L

Venous blood samples show decreased blood K and a normal anion gap.

3. The correct diagnosis for this patient is

- (A) metabolic acidosis
- (B) metabolic alkalosis
- b) respiratory acidosis
- (D) respiratory alkalosis
- (E) normal acid-base status

Ans:a

4.

Which of the following statements about this patient is correct?

- (A) She is hypoventilating
- (B) The decreased arterial $[HCO_2]$ is a result of buffering of excess H by HCO_3
- (C) The decreased blood $[K]$ is a result of exchange of intracellular H^+ for extracellular K^+
- (D) The decreased blood $[K^+]$ is a result of increased circulating levels of aldosterone
- (E) The decreased blood $[K^+]$ is a result of decreased circulating levels of antidiuretic hormone (ADH)

Ans:d

5. Use the values below to answer the following question.

Glomerular capillary hydrostatic pressure =
47 mm Hg

Bowman space hydrostatic pressure =

10 mm Hg

Bowman space oncotic pressure = 0 mm Hg

At what value of glomerular capillary oncotic pressure would glomerular filtration stop?

(A) 57 mm Hg

(B) 47 mm Hg

(C) 37 mm Hg

(D) 10 mm Hg

(E) 0 mm Hg

Ans:c

6. The reabsorption of filtered HCO₃⁻,

(A) results in reabsorption of less than 50% of the filtered load when the plasma concentration of HCO₃⁻ is 24 mEq/L

(B) acidifies tubular fluid to a pHi of 4.4

(C) is directly linked to excretion of H⁺ as NH₄⁺

(D) is inhibited by decreases in arterial PCO₂

(E) can proceed normally in the presence of a renal carbonic anhydrase inhibitor

Ans:d

7. The following information was obtained in a 20-year-old college student who was participating in a research study in the

Clinical Research Unit:

Plasma

[Inulin] = 1 mg/mL

[X] = 2 mg/mL

Urine

[Inulin] = 150 mg/mL

[X] = 100 mg/mL

Urine flow rate = 1 mL/min

Assuming that X is freely filtered, which of the following statements is most correct?

- (A) There is net secretion of X
- (B) There is net reabsorption of X
- (C) There is both reabsorption and secretion of X
- (D) The clearance of X could be used to measure the glomerular filtration rate (GFR)
- (E) The clearance of X is greater than the clearance of inulin

ans:b

8. To maintain normal H^{*} balance, total daily excretion of H^{*} should equal the daily

- (A) fixed acid production plus fixed acid ingestion
- (B) HCO₃⁻

excretion

(C) HCO.

filtered load

(D) titratable acid excretion

(E) filtered load of H*

Ans:a

10. A 58-year-old man is given a glucose tolerance test. In the test, the plasma glucose concentration is increased and glucose reabsorption and excretion are measured. When the plasma glucose concentration is higher than occurs at transport maximum (T_m), the

(A) clearance of glucose is zero

(B) excretion rate of glucose equals the filtration rate of glucose

(C) reabsorption rate of glucose equals the filtration rate of glucose

(D) excretion rate of glucose increases with increasing plasma glucose concentrations

(E) renal vein glucose concentration equals the renal artery glucose concentration

ans:d

11. A negative free-water clearance will occur in a person who

(A) drinks 2 L of distilled water in 30 minutes

(B) begins excreting large volumes of urine with an osmolarity of 100 mOsm/L after

a severe head injury

(C) is receiving lithium treatment for depression and has polyuria that is unresponsive to the administration of antidiuretic hormone (ADH)

(D) has an oat cell carcinoma of the lung, and excretes urine with an osmolarity of 1000 mOsm/L

ans:d

12. A buffer pair (HA/A) has a pK of 5.4. At a blood pH of 7.4, the concentration of HA is

(A) 1/100 that of A

(B) 1/10 that of A

(C) equal to that of A

(D) 10 times that of A

(E) 100 times that of A

ans:a

13. Which of the following would produce an increase in the reabsorption of isosmotic fluid in the proximal tubule?

(A) Increased filtration fraction

(B) Extracellular fluid (ECF) volume expansion

(C) Decreased peritubular capillary protein concentration

(D) Increased peritubular capillary hydrostatic pressure

(E) Oxygen deprivation

ans:a

14. Which of the following substances or combinations of substances could be used to measure interstitial fluid volume?

- (A) Mannitol
- (B) D₂O alone
- (C) Evans blue
- (D) Inulin and D₂O
- (E) Inulin and radioactive albumin

ans:e

15. At plasma para-aminohippuric acid (PAH) concentrations below the transport maximum (T_m), PAH

- (A) reabsorption is not saturated
- (B) clearance equals inulin clearance
- (C) secretion rate equals PAH excretion rate
- (D) concentration in the renal vein is close to zero
- (E) concentration in the renal vein equals PAH concentration in the renal artery

ans:d

16. Compared with a person who ingests 2 L of distilled water, a person with water deprivation will have a

- (A) higher free-water clearance (CH_o)
- (B) lower plasma osmolarity
- (C) lower circulating level of antidiuretic hormone (ADH)
- (D) higher tubular fluid/plasma (TF/P) osmolarity in the proximal tubule
- (E) higher rate of H₂O reabsorption in the collecting ducts

ans:e

17. Which of the following would cause an increase in both glomerular filtration rate (GFR) and renal plasma flow (RPF)?

- (A) Hyperproteinemia
- (B) A ureteral stone
- (C) Dilation of the afferent arteriole
- (D) Dilation of the efferent arteriole
- (E) constriction of the efferent arteriole

Ans:c

18. A patient has the following arterial blood values:

pH= 7.52

P_{co₂} = 20 mm Hg

(HCO₃⁻) = 16 mEq/L

Which of the following statements about this patient is most likely to be correct?

- (A) He is hypoventilating

- (B) He has decreased ionized (Ca^{2+}) in blood
- (C) He has almost complete respiratory compensation
- (D) He has an acid-base disorder caused by overproduction of fixed acid
- (E) Appropriate renal compensation would cause his arterial (HCO_3^-) to increase

ans:b

19. Which of the following would best distinguish an otherwise healthy person with severe water deprivation from a person with the syndrome of inappropriate antidiuretic hormone (SIADH)?

- (A) Free-water clearance
- (B) Urine osmolarity
- (C) Plasma osmolarity
- (D) Circulating levels of antidiuretic hormone (ADH)
- (E) Corticopapillary osmotic gradient

ans:c

20. Which of the following causes a decrease in renal Ca^{2+} clearance?

- (A) Hypoparathyroidism
- (B) Treatment with chlorothiazide
- (C) Treatment with furosemide
- (D) Extracellular fluid (ECF) volume

expansion

(E) Hypermagnesemia

ans:b

21. A patient arrives at the emergency room with low arterial pressure, reduced tissue turgor, and the following arterial blood values:

pH = 7.69

THCO₂] = 57 mEq/L

PcO₂ = 48 mm Hg

Which of the following responses would also be expected to occur in this patient?

(A) Hyperventilation

(B) Decreased K secretion by the distal tubules

(C) Increased ratio of H₂PO₄⁻ to HPO₄²⁻ in urine

(D) Exchange of intracellular H⁺ for extracellular K⁺

ans:d

22. A woman has a plasma osmolarity of 300 mOsm/L and a urine osmolarity of 1200 mOsm/L. The correct diagnosis is

(A) syndrome of inappropriate antidiuretic hormone (SIADH)

(B) water deprivation

(C) central diabetes insipidus

- (D) nephrogenic diabetes insipidus
- (E) drinking large volumes of distilled water

ans:b

23. A patient is infused with para-aminohippuric acid (PAH) to measure renal blood flow (RBF). She has a urine flow rate of 1 mL/min, a plasma [PAH] of 1 mg/mL, a urine [PAH] of 600 mg/mL, and a hematocrit of 45%. What is her "effective" RBF?

- (A) 600 mL./min
- (B) 660 mL/min
- (C) 1091 mL/min
- (D) 1333 mL/ min

ans:c

24. Which of the following substances has the highest renal clearance?

- (A) Para-aminohippuric acid (PAH)
- (B) Inulin
- (C) Glucose
- (D) Na⁺
- (E) Cl⁻

ans:a

25. A woman runs a marathon in 90°F weather and replaces all volume lost in sweat by drinking distilled water. After the

marathon, she will have

- (A) decreased total body water (TBW)
- (B) decreased hematocrit
- (C) decreased intracellular fluid (ICF) volume
- (D) decreased plasma osmolarity
- (E) increased intracellular osmolarity

ans:d

26. Which of the following causes hyperkalemia?

- (A) Exercise
- (B) Alkalosis
- (C) Insulin injection
- (D) Decreased serum osmolarity
- (E) Treatment with β -agonists

ans:a

27. Which of the following is a cause of metabolic alkalosis?

- (A) Diarrhea
- (B) Chronic renal failure
- (C) Ethylene glycol ingestion
- (D) Treatment with acetazolamide
- (E) Hyperaldosteronism
- (F) Salicylate poisoning

ans:e

28. Which of the following is an action of para-

thyroid hormone (PTID on the renal tubule?)

- (A) Stimulation of adenylate cyclase
- (B) Inhibition of distal tubule K⁺ secretion
- (C) Inhibition of distal tubule Ca²⁺ reabsorption
- (D) Stimulation of proximal tubule phosphat reabsorption
- (E) Inhibition of production of 1,25-dihydroxycholecalciferol

Ans:a

29. A man presents with hypertension and hypokalemia. Measurement of his arterial blood gases reveals a pH of 7.5 and a calculated HCO₃⁻ of 32 mEq/L. His serum cortisol and urinary vanillylmandelic acid (VMA) are normal, his serum aldosterone is increased, and his plasma renin activity is decreased. Which of the following is the most likely cause of his hypertension?

- (A) Cushing syndrome
- (B) Cushing disease
- (C) Conn syndrome
- (D) Renal artery stenosis
- (E) Pheochromocytoma

Ans:c

30ans:d

30. Which set of arterial blood values describes a heavy smoker with a history of emphysema and chronic bronchitis who is becoming increasingly somnolent?

	pH	HCO ₃ ⁻ (mEq/L)	Pco ₂ (mm Hg)
(A)	7.65	48	45

31 ans:b

31. Which set of arterial blood values describes a patient with partially compensated respiratory alkalosis after 1 month on a mechanical ventilator?

	pH	HCO ₃ ⁻ (mEq/L)	Pco ₂ (mm Hg)
(A)	7.65	48	15

32. Which set of arterial blood values describes a patient with chronic renal failure (eating a normal protein diet) and decreased urinary excretion of NH₄⁺?

	pH	HCO ₃ ⁻ (mEq/L)	Pco ₂ (mm Hg)
(A)	7.65	48	45
(B)	7.50	15	20
(C)	7.40	24	40
(D)	7.32	30	60
(E)	7.31	16	33

32 ans:e

33 ans:e

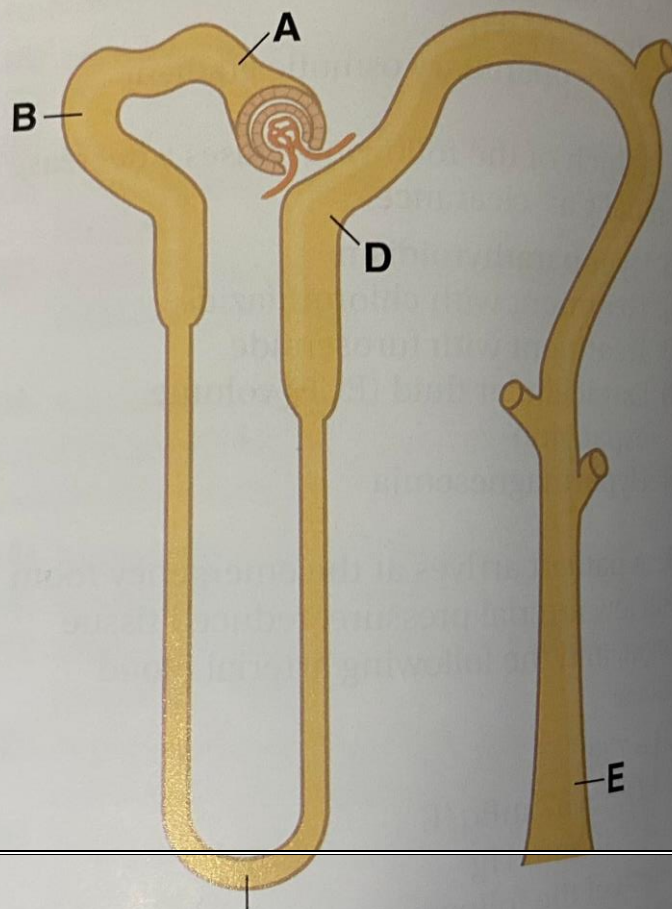
33. Which set of arterial blood values describes a patient with untreated diabetes mellitus and increased urinary excretion of NH_4^+ ?

34. Which set of arterial blood values describes a patient with a 5-day history of vomiting?

	pH	HCO_3^- (mEq/L)	Pco_2 (mm Hg)
(A)	7.65	48	45
(B)	7.50	15	20
(C)	7.40	24	40
(D)	7.32	30	60
(E)	7.31	16	33

34 ans:a

The following figure applies to Questions 35-39.



35. At which nephron site does the amount of K^+ in tubular fluid

exceed the amount of
filtered K in a person on a high-K* diet?

- (A) Site A
- (B) Site B
- (C) Site C
- (D) Site D
- (E) Site E

Ans:e

36. At which nephron site is the tubular
fluid/plasma (TF/P) osmolarity lowest in a
person who has been deprived of water?

- (A) Site A
- (B) Site B
- (C) Site C
- (D) Site D
- (E) Site E

Ans:d

37. At which nephron site is the tubular
fluid inulin concentration highest during
antidiuresis?

- (A) Site A
- (B) Site B
- (C) Site C
- (D) Site D
- (E) Site E

Ans:e

38. At which nephron site is the tubular fluid inulin concentration lowest?

- (A) Site A
- (B) Site B
- (C) Site C
- (D) Site D
- (E) Site E

Ans:a

39. At which nephron site is the tubular fluid glucose concentration highest?

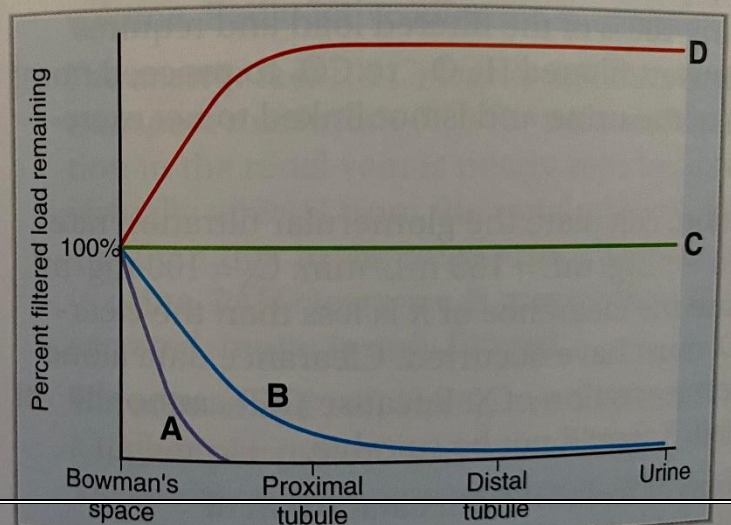
- (A) Site A
- (B) Site B
- (C) Site C
- (D) Site D
- (E) Site E

Ans:a

40. Which curve describes the inulin profile along the nephron?

- (A) Curve A
- (B) Curve B
- (C) Curve C
- (D) Curve D

The following graph applies to Questions 40–42. The curves show the percentage of the filtered load remaining in the tubular fluid at various sites along the nephron.



Ans:c

41. Which curve describes the alanine profile along the nephron?

- (A) Curve A
- (B) Curve B
- (C) Curve C
- (D) Curve D

Ans:a

42. Which curve describes the para-amino-hippuric acid (PAH) profile along the nephron?

- (A) Curve A
- (B) Curve B
- (C) Curve C
- D) Curve D

Ans:d

43. A 5-year-old boy swallows a bottle of aspirin (salicylic acid) and is treated in the emergency room. The treatment produces a change in urine pH that increases the excretion of salicylic acid. What was the change in urine pH, and what is the mechanism of increased salicylic acid excretion?

- (A) Acidification, which converts salicylic acid to its HA form
- (B) Alkalinization, which converts salicylic

acid to its A form

(C) Acidification, which converts salicylic acid to its A- form

(D) Alkalinization, which converts salicylic acid to its HA form

ans:b

44 ans:d

44. A female graduate student is hyperventilating prior to her oral comprehensive examination. She is light-headed, and her feet and hands are numb and tingling. Which of the following set of blood values would be observed in the emergency room?

	pH	P _{co₂} , mm Hg	P _{o₂} , mm Hg	Ionized Ca ²⁺
(A)	7.3	30	100	Decreased
(B)	7.3	50	90	Increased
(C)	7.4	40	100	Normal
(D)	7.5	30	110	Decreased
(E)	7.5	50	90	Increased