

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



**UGS Physiology Test Bank
(USMLE STEP 1 & quizlet)**

•MID & FINAL•

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1. A patient with acute glomerulonephritis has a total plasma of 2.5 mmol/L and a GFR of 160 L/day. What is the estimated daily filtered load of calcium?

- A. 64 mmol/day
- B. 120 mmol/day
- C. 240 mmol/day
- D. 400 mmol/day
- E. 800 mmol/day

Correct Answer: C

2. In below figure, which point depicts the excreted glucose in a 31-year-old woman with untreated nephrogenic diabetes insipidus?

- A. A
- B. B
- C. C
- D. D
- E. E

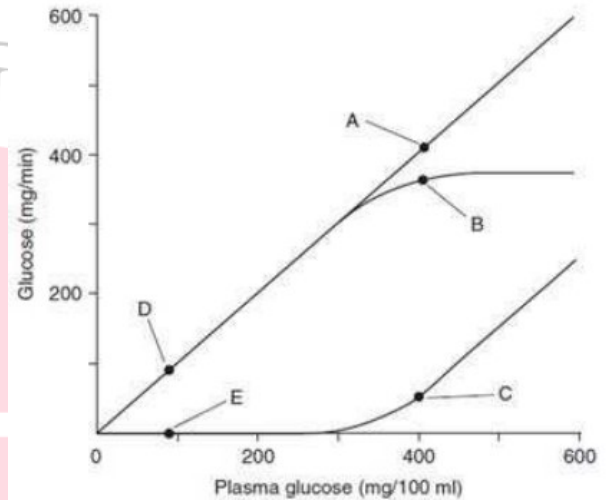


FIG. 2-11

Correct Answer: E

3. In previous figure, which point depicts the renal filtered glucose in an 11-year-old male with untreated Type I diabetes mellitus?

- A. A
- B. B
- C. C
- D. D
- E. E

Correct Answer: A

4. A 57-year-old woman presents with an arterial pressure of 180/115 mm Hg, and blood creatinine levels are elevated. Renal angiography reveals a severe bilateral stenosis of the renal arteries. Which of the following are elevated also?

- A. ADH secretion
- B. GFR
- C. para-aminohippurate (PAH) clearance
- D. renin secretion
- E. urine output

Correct Answer: D

5. A 35-year-old weight lifter, who has been injecting testosterone for muscle mass augmentation, is evaluated for sterility and found to have an extremely low sperm count. Which of the following is an effect of testosterone and contributes to the mentioned sterility?

- A. activation of inhibin
- B. feedback activation of leptin
- C. feedback inhibition of GnRH
- D. inhibition of seminal prostaglandins
- E. lowered core temperature

Correct Answer: C

6. Which of the following is likely to cause a negative free-water clearance by the kidney?

- A. central diabetes insipidus
- B. demeclocycline, an inhibitor of the renal tubular actions of ADH
- C. nephrogenic diabetes insipidus
- D. water deprivation
- E. water drinking

Correct Answer: D

7. A patient presents with fever (her core temperature equals 39°C, with normal core temperature equaling 36.5°C) as well as an elevated white cell count. Which of the following statements is true regarding the patient's elevated core body temperature?

- A. Bacterial toxins act directly on skeletal muscle to increase muscle contractile activity, thereby generating heat and elevating core temperature.
- B. Core body temperature now exceeds the hypothalamic set point temperature.
- C. Increased core body temperature is due to increased heat production by leukocytes.
- D. Increased prostaglandins have raised the hypothalamic set point temperature.
- E. The patient will be sweating in an effort to further elevate core temperature.

Correct Answer: D

8. A newlywed 23-year-old woman and her 28-year-old husband are evaluated for infertility. They have been unable to conceive a child despite regular intercourse for the past 12 months. The first step of this couple's infertility workup is to determine whether ovulation occurs regularly. Which of the following hormones is directly responsible for ovulation?

- A. estradiol
- B. estriol
- C. follicle-stimulating hormone (FSH)
- D. inhibin
- E. luteinizing hormone (LH)

Correct Answer: E

9. In patients with type 4 renal tubular acidosis (RTA) aldosterone deficiency is often a prominent finding. Distal tubular transport of which of the following ions will be affected in these patients?

- A. hydrogen and potassium in exchange for sodium
- B. hydrogen only
- C. potassium only
- D. sodium and bicarbonate
- E. sodium only

Correct Answer: A

10. Altered plasma renin levels can occur in both normal and pathologic conditions. Which of the following states is associated with a decrease in plasma renin levels?

- A. heart failure
- B. primary aldosteronism
- C. renal artery stenosis
- D. salt restriction
- E. upright posture

Correct Answer: B

11. Which of the following is a true statement regarding renal clearance of a substance?

- A. is measured in milligram per minute
- B. glucose is greater than that of insulin in the normal kidney
- C. insulin is zero
- D. PAH remains constant regardless of the plasma level
- E. potassium clearance will increase after an injection of aldosterone

Correct Answer: E

12. One of your diabetic patients has a blood glucose level of 200 mg/dL. Surprisingly, a dipstick test is negative for urinary glucose. How could this finding be explained?

- A. dipstick tests are more sensitive for reducing sugars other than glucose
- B. the patient has defective tubular glucose transporters
- C. the patient has diabetes insipidus
- D. the patient has significantly reduced GFR
- E. the patient is in a state of antidiuresis

Correct Answer: D

13. A 14-year-old female presenting with polyuria is subsequently diagnosed with Type I diabetes mellitus. The polyuria results from an osmotic diuresis that involves primarily which part of the renal tubule?

- A. collecting duct
- B. glomerulus
- C. juxtaglomerular apparatus
- D. proximal tubule
- E. thick ascending limb of the loop of Henle

Correct Answer: D

14. A person has an elevated plasma osmolality and reduced plasma ADH level and excretes a large volume of osmotically dilute urine. The urine contains no glucose. What is the most likely explanation for this situation?

- A. congestive heart failure
- B. nephrogenic diabetes insipidus
- C. neurogenic diabetes insipidus
- D. primary polydipsia
- E. uncontrolled diabetes mellitus

Correct Answer: C

15. With respect to below figure, which of the following will decrease the GFR?

- A. decreased hydrostatic pressure in bowmen space
- B. decreased plasma protein concentration in glomerular capillary
- C. dilation of afferent arteriole
- D. dilation of efferent arteriole
- E. increased aldosterone secretion by juxtaglomerular

Correct Answer: D

16. End-stage chronic renal disease is associated with a glomerular filtration rate (GFR) of less than 15 mL/min and an increase in which of the following blood values?

- A. calcium
- B. erythropoietin (EPO)
- C. hematocrit
- D. phosphate
- E. 1,25-(OH vitamin

Correct Answer: D

17. Although most cases of hypertension are "essential," meaning the underlying disorder is unknown, about 10% of cases are "secondary hypertension" due to a specific, usually treatable cause. Which of the following alternatives can lead to secondary hypertension?

- A. adrenal insufficiency
- B. estrogen deficiency
- C. hyperparathyroidism
- D. renal artery stenosis
- E. volume depletion

Correct Answer: D

18. Which of the following is a feature of the principal cell in the cortical collecting duct?

- A. normally generates a lumen-positive transepithelial potential difference
- B. normally reabsorbs potassium and secretes sodium
- C. responds to aldosterone with increased water permeability via aquaporins
- D. utilizes a Na^+/K^+ -ATPase in the basolateral cell membrane
- E. utilizes a $\text{Na}^+/\text{K}^+ / 2\text{Cl}^-$ cotransport protein in the luminal cell membrane

Correct Answer: D

19. A 25-year-old male athlete has just completed a long distance bicycle race during a hot, humid day. At the conclusion of the race, he provides a urine sample for testing. Assuming that his fluid intake during the race was zero, in what portion of the nephron shown in below figure is the tubular fluid osmolality the lowest?

- A. A
- B. B
- C. C
- D. D
- E. E

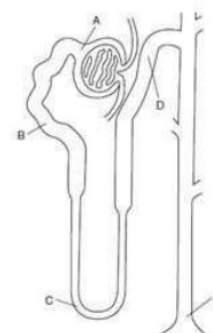


FIG. 2-14

Correct Answer: D

20. Which has the greatest renal clearance?

- A. PAH
- B. Glucose
- C. Urea
- D. Water
- E. Inulin

Answer: A

21. The ascending limb of the Loop of Henle is:

- A. Impermeable to Na⁺
- B. Involved in active transport of K⁺ into the lumen
- C. Involved in active transport of Cl⁻ out of lumen
- D. Involved in active transport of Na⁺ into lumen
- E. Hypotonic at the top
- F. None of the above
- G. Actively transports water

Answer: E

22. Water filtration by the kidney:

- A. Is 180 l/hr
- B. Is 125 ml/min
- C. Up to 90% is reabsorbed
- D. Most drugs have MW less than 600 and are freely filtered

Answer: B

23. Which ONE of the following is not involved in the regulation of glomerular filtration rate (GFR)?

- A. Juxtaglomerular apparatus
- B. Arterial pressure
- C. Efferent arteriolar tone
- D. Na content in distal tubule
- E. Afferent arteriolar tone

Answer: B

24. The permeability of glomerular capillaries:

- A. Equals that of other capillaries
- B. Is much less than that of other capillaries
- C. Is equal for cationic and anionic molecules of equal size
- D. Approaches 100% for neutral molecules of 8nm diameter
- E. Is about 50 times as great as that of a skeletal muscle capillary

Answer: E

25. Kidney:

- A. Maximum urine osmolality of 1200 mOsm/l
- B. Min urine osmolality 100mosmol/Kg
- C. Minimum osmolality = 20mOsmol/kg

Answer: A

26. Increased GFR is caused by:

- A. Increased cardiac output
- B. Afferent arteriolar vasoconstriction
- C. Efferent arteriolar vasodilatation
- D. Increased chloride delivery to the macula densa

Answer: A

27. Which of the following is involved in the regulation of glomerular filtration rate (GFR)?

- A. Juxtaglomerular apparatus
- B. Afferent arteriolar tone
- C. Efferent arteriolar tone
- D. Chloride transport at the macula densa
- E. All of the above

Answer: E

28. The formula for GFR is:

- A. $GFR = K_f (HPG - HPB + OPG - OPB)$
- B. $GFR = K_f (HPG - HPB - OPG + OPB)$
- C. $GFR = K_f (HPG + HPB - OPG + OPB)$
- D. $GFR = K_f (HPG + HPB - OPG - OPB)$
- E. $GFR = K_f (HPG - HPB - OPG - OPB)$

Answer: B

29. The effect of PTH on the kidney is to:

- A. Increase Ca excretion and increase phosphate excretion
- B. Increase Ca excretion and decrease phosphate excretion
- C. Decrease Ca excretion and increase phosphate excretion
- D. Decrease Ca excretion and decrease phosphate excretion
- E. None of the above

Answer: C

30. Water handling by kidney (% reabsorption)

- A. 93%
- B. 94%
- C. 99%
- D. 99.4%
- E. 99.9%

Answer: E

31. Resistance to renal blood flow is chiefly determined by:

- A. Renal artery
- B. Afferent & efferent arterioles
- C. Interlobular & arcuate arteries
- D. Peritubular capillaries

Answer: B

32. For renal clearance of a substance to exceed Inulin,

- A. Increase in GFR
- B. Must be secreted by either the proximal or distal tubules
- C. Must have a lower molecular weight than Inulin

Answer: B

33. Water excretion by the kidney is due to:

- A. Osmosis
- B. Active transport into the lumen
- C. Passive secretion in the collecting tubules
- D. Solvent drag
- E. Facilitated diffusion
- F. Paracellular movement

Answer: D

34. Angiotensin II causes:

- A. Increases proximal tubular reabsorption of Na & H₂O & increases secretion of K⁺
- B. Increases distal tubular reabsorption of Na & H₂O & decreases secretion of K⁺
- C. Decreases distal tubular reabsorption of Na & H₂O
- D. Increases excretion of Na & H₂O

Answer: A

35. Glomerulotubular balance:

- A. Involves afferent arteriole feedback loop
- B. Involves efferent arteriole feedback loop
- C. Juxtaglomerular complex
- D. Ability to increase tubular absorption in response to an increase in filtered load
- E. None of the above
- F. Tubular resorption is matched to GFR

Answer: D

36. Kidneys produce:

- A. Erythropoietin
- B. ADH
- C. Angiotensin II
- D. ANP
- E. Cholecalciferol

Answer: A

37. Renal nerve sympathetic stimulation:

- A. Causes increased sodium reabsorption from the PCT
- B. Inhibits renin release
- C. Increased GFR

Answer: A

38. Glomerular filtration rate (GFR):

- A. Is independent of the size of the capillary bed
- B. Depends only on the hydrostatic and osmotic pressure differences across the capillary
- C. Is determined by the same forces governing filtration across all other capillaries
- D. Depends only on the permeability of the capillary
- E. Requires active transport

Answer: C

39. Pressure diuresis:

- A. Due to decreased reabsorption of Na⁺ & water in peritubular capillaries
- B. Regulated by macula densa
- C. Increase ADH
- D. Increase angiotensin
- E. Control by JGA

Answer: A

40. What is the minimum amount of urine required to excrete 600mOsm:

- A. 100ml
- B. 500ml
- C. 1 liter
- D. 2 liter
- E. 4 liter

Answer: B

41. Increase in GFR occurs with:

- A. Increased sympathetic stimulation
- B. Decreased renal blood flow
- C. Hypoproteinaemia
- D. Ureteric obstruction
- E. None of the above

Answer: C

42. Regarding renal clearance:

- A. Inulin clearance measures renal blood flow
- B. Creatine clearance correlates with GFR
- C. Filtration fraction measured as inulin clearance/ PAH clearance

Answer: C

43. The clearance (or 'renal regulation') of which ONE of the following is NOT regulated by a hormone:

- A. Sodium
- B. Potassium
- C. Calcium
- D. Phosphate
- E. Sulphate

Answer: E

44. Regarding water reabsorption in the collecting tubules:

- A. depends on aldosterone levels
- B. collecting tubules able to reabsorb 60-70% of water
- C. depends on renin levels
- D. loops of henle are ONLY located in the renal medulla (may be from another question)

Answer: C. indirectly renin increases ADH secretion

45. Glycosuria is most likely to occur with:

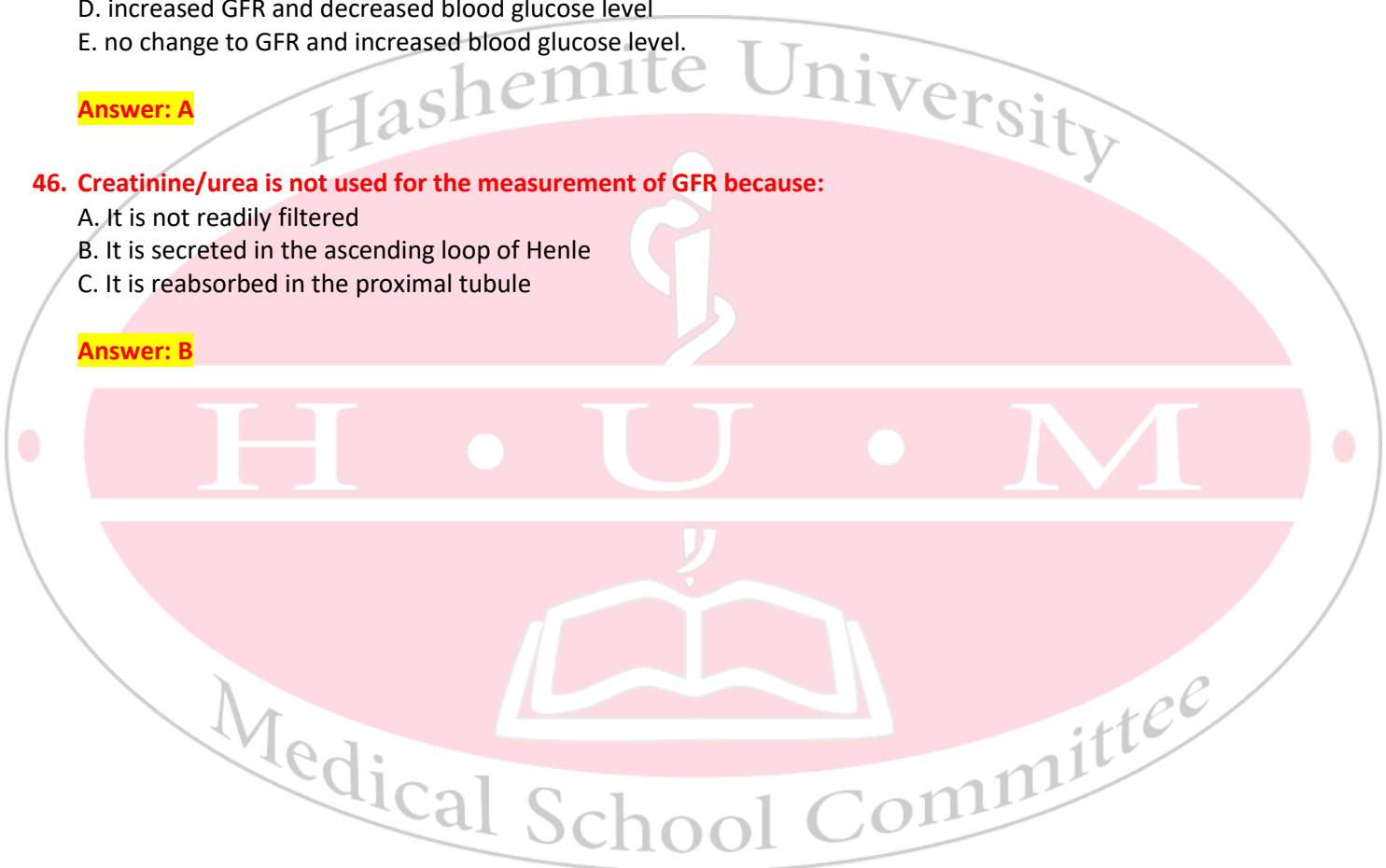
- A. increased GFR and increased blood glucose level
- B. decreased GFR and increased blood glucose level
- C. decreased GFR and decreased blood glucose level
- D. increased GFR and decreased blood glucose level
- E. no change to GFR and increased blood glucose level.

Answer: A

46. Creatinine/urea is not used for the measurement of GFR because:

- A. It is not readily filtered
- B. It is secreted in the ascending loop of Henle
- C. It is reabsorbed in the proximal tubule

Answer: B



لا ننسونا من صالح دُعاءكم ❤️

الفريق العلمي - لجنة الطب البشري