

1. Which feature most directly explains why changes in kidney function can immediately influence systemic blood pressure?
 - A. High daily filtrate volume
 - B. Renin release from renal vessels
 - C. Location of the kidneys outside the peritoneum
 - D. Presence of ureters connecting to the bladder
2. If the filtration slits became narrower than normal, what is the first physiological change expected?
 - A. Reduced passage of small solutes into the filtrate
 - B. Increased urine osmolarity
 - C. Higher secretion of hydrogen ions
 - D. Increased erythropoietin release
3. Which statement best explains why glomerular filtration occurs at a much higher rate than filtration in other capillary beds?
 - A. The filtrate is immediately drained by the ureters
 - B. Glomerular capillaries have unusually high hydrostatic pressure
 - C. Podocytes consume less ATP
 - D. The afferent arteriole has a lower resistance than systemic arteries
4. A substance that easily crosses the glomerular endothelium but fails to pass the slit membrane is most likely limited by its:
 - A. Charge
 - B. Shape
 - C. Size
 - D. Solubility
5. Which kidney function prevents major fluctuations in plasma osmolarity despite variable solute intake?
 - A. Tubular secretion of ions
 - B. Selective reabsorption of water and solutes
 - C. Filtration through fenestrated capillaries
 - D. Erythropoietin production
6. If efferent arteriole diameter increases significantly, how will GFR most likely be affected?
 - A. Increase due to higher incoming blood flow
 - B. Decrease due to reduced glomerular pressure
 - C. Remain unchanged
 - D. Increase due to increased filtrate reabsorption
7. Which component of the filtration membrane primarily prevents the filtration of large plasma proteins?
 - A. Fenestrated endothelial layer
 - B. Basal lamina
 - C. Filtration slit membrane
 - D. Pedicels
8. A drug that inhibits podocyte function would immediately impair:
 - A. Tubular reabsorption
 - B. Filtration selectivity
 - C. Hormone production
 - D. Renin secretion

9. Which function of the kidney most directly contributes to long-term acid–base homeostasis?
- A. Aldosterone release
 - B. Bicarbonate conservation
 - C. Urea excretion
 - D. Glucose synthesis
10. The urine volume would increase most dramatically if the kidney failed to:
- A. Filter small solutes
 - B. Reabsorb 99% of the filtered water
 - C. Secrete certain drugs
 - D. Produce calcitriol
11. Which structure ensures that filtration pressure remains high despite downstream resistance?
- A. Renal cortex
 - B. Afferent arteriole
 - C. Efferent arteriole
 - D. Collecting ducts
12. Failure of the basal lamina would most likely result in:
- A. Proteinuria
 - B. Dehydration
 - C. Reduction in renin production
 - D. Lack of erythropoietin release
13. Which process distinguishes tubular secretion from filtration?
- A. Movement from blood to filtrate via active transport
 - B. Passive passage through fenestrations
 - C. Movement of water based on pressure
 - D. Reabsorption of useful ions
14. If kidneys stop producing calcitriol, which systemic effect becomes compromised first?
- A. Sodium retention
 - B. Calcium homeostasis
 - C. Acid–base balance
 - D. Glucose synthesis
15. Which event primarily allows kidneys to regulate blood ionic composition?
- A. Filtration at the glomerulus
 - B. Selective tubular reabsorption
 - C. Storage in the bladder
 - D. Hormone excretion
16. Which characteristic of the glomerular capillaries contributes most to their high filtration capacity?
- A. Their location in the cortex
 - B. Their extensive branching surface area
 - C. Their low oxygen requirement
 - D. Their proximity to the ureters
17. If the slit membrane allowed larger molecules to pass, which immediate change would be seen in the filtrate?
- A. Increased hydrogen ion concentration
 - B. Presence of more plasma proteins
 - C. Lower water content

D. Absence of glucose

18. Which kidney function is shared with the liver?

- A. Production of erythropoietin
- B. Gluconeogenesis from amino acids
- C. Excretion of foreign substances
- D. Regulation of blood pressure

19. What explains why the kidneys can influence blood glucose even during fasting?

- A. Glucose filtration is minimal
- B. Tubules secrete glucose when needed
- C. Tubules synthesize glucose from glutamine
- D. Bladder stores glucose

20. Which statement best describes the direction of movement in tubular secretion?

- A. Filtrate → blood
- B. Blood → filtrate
- C. Collecting duct → ureter
- D. Loop of Henle → glomerulus

21. A reduction in fenestration size would primarily decrease filtration by limiting:

- A. Water movement
- B. Passage of small solutes
- C. Blood flow into the capsule
- D. Tubular secretion

22. Which structure directly determines what molecules can pass through the final stage of the filtration barrier?

- A. Fenestrations
- B. Slit membrane
- C. Basal lamina
- D. Afferent arteriole

23. If kidneys lose the ability to regulate bicarbonate levels, the blood will most likely become:

- A. More alkaline
- B. More acidic
- C. Lower in osmolarity
- D. Higher in glucose

24. Which of the following explains why kidneys are essential for long-term blood volume control?

- A. They filter the entire blood volume every few minutes
- B. They selectively conserve or eliminate water
- C. They activate the sympathetic nervous system
- D. They store excess solutes

25. An increase in filtration fraction indicates that:

- A. More plasma is entering the afferent arteriole
- B. A larger percentage of plasma becomes filtrate
- C. Tubules are reabsorbing less
- D. Renal blood flow has increased

26. If podocyte pedicels are damaged and retract, what happens to GFR?
A. GFR decreases due to reduced slit surface area
B. GFR increases dramatically
C. No change in GFR occurs
D. Filtration stops completely
27. Which renal function most directly protects the body from toxic accumulation of drugs?
A. Tubular secretion
B. Filtration through fenestrations
C. Water reabsorption
D. Calcitriol production
28. Glomerular filtrate differs from plasma mainly because it lacks:
A. Water
B. Ions
C. Large proteins
D. Glucose
29. The major reason that glomerular pressure stays high is because:
A. Blood enters faster than it exits the kidney
B. The efferent arteriole has higher resistance than the afferent
C. The renal cortex compresses the vessels
D. The tubules reabsorb solutes rapidly
30. Which consequence would occur first if tubular reabsorption dropped significantly?
A. Reduced urine volume
B. Increased urine volume
C. Higher plasma osmolarity
D. Increased renin levels

ANSWER KEY WITH EXPLANATIONS

1. B – Renin links kidney activity to blood pressure control.
2. A – Narrower slits first reduce solute passage.
3. B – High glomerular hydrostatic pressure drives fast filtration.
4. C – The slit membrane mainly rejects molecules by size.
5. B – Osmolarity is stabilized by selective reabsorption.
6. B – Efferent dilation lowers glomerular pressure → lower GFR.
7. B – Basal lamina blocks large plasma proteins.
8. B – Podocytes determine filtration selectivity.
9. B – Kidneys maintain pH long-term by conserving bicarbonate.
10. B – Water reabsorption failure massively increases urine volume.
11. C – Efferent arteriole resistance maintains high pressure.
12. A – Loss of basal lamina allows proteins into filtrate.
13. A – Secretion uses active transport from blood to filtrate.
14. B – Calcitriol is essential for calcium homeostasis.
15. B – Ionic composition is adjusted by tubular reabsorption.
16. B – Large branching surface area enhances filtration capacity.
17. B – Larger pores allow proteins into filtrate (proteinuria).
18. B – Both kidney and liver perform gluconeogenesis.
19. C – Tubules synthesize glucose from glutamine during fasting.
20. B – Secretion moves blood → filtrate.

- 21. B – Smaller fenestrations reduce solute movement.
- 22. B – The slit membrane is the final selective barrier.
- 23. B – Loss of bicarbonate handling causes acidosis.
- 24. B – Water conservation/excretion controls blood volume.
- 25. B – A larger percent of plasma becomes filtrate.
- 26. A – Pedicel retraction decreases filtration surface → lower GFR.
- 27. A – Secretion eliminates many drugs and toxins.
- 28. C – Filtrate lacks large plasma proteins.
- 29. B – Efferent arteriole resistance keeps pressure high.
- 30. B – Less reabsorption → more fluid remains → more urine.