

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. Secret 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.