

Chapter 26 Study Guide  
The Urinary System  
Tortora & Derrickson

1. What organs make-up the urinary system?
2. What is the primary function of the kidneys? What are other functions preformed by the kidneys?
3. What is metabolic waste? Where does it come from? How do we get rid of metabolic waste?
4. Nitrogen waste products are some of the most toxic waste products produced by the body. List the three major nitrogen waste products and explain how each waste product is produced in the body?
5. What is azotemia?
6. What four organ systems play a role in excretion?
7. What is the position of the kidneys in the peritoneum? What other related structures share this relative position of the kidneys?
8. How is the kidney protected? Why are the kidneys “so delicate”?
9. How does blood flow through the kidney?
10. What does the renal fraction indicate? How does this compare to the kidney’s size relative to the rest of the human body?
11. Trace the flow of blood between the aorta and inferior vena cava through the kidney:
12. What is the functional unit of the kidney? Explain the two components of this functional unit and the role that each component plays in the process of urine formation:
13. How many of these units are in each kidney? How many of these units do you need to survive?
14. How are the nephrons arranged in the kidney? Indicate the location of the two subclasses of nephrons.
15. To understand renal physiology you need to understand the unique blood flow of the kidney. How many capillary beds can you identify in the renal circulation? / b) What term describes two capillary beds between an artery and a vein? / c) Where within the kidney do you find these capillaries?

16. Urine is formed by the nephron. What are the four steps of urine formation?
17. Where does filtration occur in the nephron?
18. What term describes kidney filtration? How much plasma is filtered in a minute? In a day? How much urine is made in a day?
19. How much filtrate is “reabsorbed”?
20. What are the three segments of the renal tubules?
21. Trace the fluid from where the glomerular filtrate is formed to the point where it leaves the body:
22. What is the difference between glomerular filtrate, tubular fluid and urine? Where are these fluids found?
23. What type of molecules may pass freely through filtration membrane? What type of substances can not be filtered?
24. What are the three mechanisms that regulate GFR? a) What are the names of the two mechanisms of autoregulation? / b) What is the anatomy associated with each mechanism? / c) What are two important “factors” about renal autoregulation?
23. What type of nerve fibers innervate the kidneys? When are these fibers activated and how is blood flow altered?
25. The rennin-angiotensin-aldosterone mechanism has profound effects throughout the body. When blood pressure drops the sympathetic fibers cause the smooth muscle in the afferent arterioles to relax but at the same time the JG cells release an enzyme called renin. // Why is renin called an enzyme and not a hormone? // b) What is the function of angiotensin converting enzyme and where is it located? // c) Is angiotensin II an enzyme or hormone? Why? // d) What are the effects angiotensin II on the body?
26. What is the “key” cation that is used in the PCT to absorb molecules like glucose? (think co-transport and symports!)
27. What is a symport and how is this related to sodium reabsorption in the PCT?
28. What is a secondary active transport? Explain this process by using the sodium-glucose transport protein model.
29. What is glycosuria? Explain this condition in terms of tubular reabsorption and the glucose transport maximum index
30. What is tubular secretion?

31. What is the homeostatic function of these hormones: a) Aldosterone b) Atrial natriuretic peptide c) Antidiuretic hormone and d) Parathyroid hormone ?
32. How does the function of the PCT and DCT differ? (general terms)
33. In what area of the kidneys are the collecting ducts located?
34. The collecting ducts make it possible to create hypertonic urine. What two processes make this possible?
35. What is a countercurrent multiplier and where is it located? What is the range of osmolarity created by this system?
36. What is the countercurrent exchange system and what structures perform this function?
37. What is diuresis? When might glucose become an osmotic diuretic?
38. What happens when you are dehydrated?
39. Urinalysis:
  - a. Appearance
  - b. Odor
  - c. Specific gravity
  - d. Osmolarity
  - e. pH
  - f. chemical composition
40. Urine Volumes
  - a. Normal daily volume
  - b. Polyuria
  - c. Oliguria
  - d. Anuria
41. How is the diuresis caused by diabetes insipidus different than diabetes mellitus?
42. Diuretics: caffeine vs alcohol:
43. What is the anatomy of the ureters and how is urine moved into the bladder?
44. What is the anatomy of the urinary bladder?
45. What is the micturition reflex?

## Hot List Questions!

1. What are the functions of the urinary system?
2. What are the organs of the urinary system?
3. What is urine formed? Four steps? Significance of each step?
4. How is glucose reabsorbed? Significance of glucose transport maximum? How much of the filtered glucose passes into the urine?
5. What is the difference in the mechanisms for aldosterone and antidiuretic hormones?  
Tonicity?
6. What term is used to describe the location of the kidney?
7. What is the structure and function of the urinary bladder?
8. Where does filtration occur in the kidney?
9. Describe the function of the three different types of capillaries in the kidney? Location?
10. Where are the receptors for ADH and aldosterone located?
11. What mechanisms are responsible for making the deep medullary interstitial fluid hypertonic? Associated capillaries?
12. Where do we find filtrate, tubular fluid, and urine within the nephron?
13. What is the micturition reflex?
14. What percent of the glomerular filtrate is reabsorbed?
15. How much urine is produced each day?
16. What disease is caused by a lack of ADH secretion?