

Osmoregulation and Excretion

Chapter 44

1. Why aren't any freshwater animals osmoconformers?
2. Why must a freshwater fish use ATP to move salt from the water in which it lives to its blood?
3. Describe the different osmoregulation challenges faced by freshwater and marine fishes.
4. Researchers discovered that a camel in the sun required much more water when its fur was shaved off even though its body temperature was the same. Propose an explanation for the relationship between osmoregulation and the insulation provided by fur.
5. Why do aquatic animals, mammals, and reptiles secrete nitrogenous wastes in different forms?
6. Describe the basic functions of filtration, reabsorption, secretion, and excretion.
7. Kidney failure is often treated by hemodialysis, in which blood diverted out of the body is filtered and then allowed to flow on one side of a semipermeable membrane. Fluid called dialysate flows in the opposite direction on the other side of the membrane. In replacing the absorption and secretion of solutes in a functional kidney, the makeup of the starting dialysate is critical.
 - a) Why does the dialysate flow in the opposite direction to the blood?
 - b) Describe the initial solute composition that would work best?
8. Describe what happens to the filtrate as it moves through the
 - a) proximal tubule
 - b) descending limb of the loop of Henle
 - c) ascending limb of the loop of Henle
 - d) distal tubule
 - e) collecting duct
9. Caffeine is a diuretic. The mechanism of action is to inhibit the reabsorption of Na^+ in the nephrons. Explain the effects of caffeine on urine production.
10. A particular medication decreases the blood pressure in the afferent arteriole leading to a the glomerulus. Predict the effect of the drug on blood filtration.
11. Why is water continuously lost as it moves through the descending limb of the loop of Henle?
12. Why is salt removed from the filtrate as it moves through the ascending limb of the loop of Henle?
13. The filtrate becomes less concentrated as it moves through the ascending limb of the loop of Henle even though no water is added to it. How can this be?
14. How is counter-current exchange an important aspect of the function of the kidney?
15. Describe how the RAAS helps regulate water balance.
16. People (not you, of course) often report increased urination and dehydration when consuming alcohol. Provide an explanation.
17. How can eating salty food affect kidney function?
18. Conn's syndrome is a condition caused by tumors of the adrenal cortex that secrete excess aldosterone in an uncontrolled manner. Predict the major symptom you would expect and justify your prediction.