Renal Absorption and Secretion

To complete this worksheet, select:

Module: Balancing Fluids
Activity: Animations
Title: Renal Absorption and Secretion

Introduction

1. Where does renal absorption and secretion occur? ________________________________

2. Define what happens during these processes.
   a. absorption - _______________________________________________________________
   b. secretion - _______________________________________________________________

3. Due to very high glomerular filtration rates, nearly the entire volume of the blood enters the renal tubules every 30 minutes. Obviously, most of it must be reabsorbed to avoid dehydration.
   a. What part of the tubule achieves most of the reabsorption?
      _______________________________________________________________________
   b. Where does further reabsorption and “fine tuning” occur? ____________________________
      _______________________________________________________________________

4. a. Describe paracellular reabsorption. __________________________________________
        _______________________________________________________________________
        _______________________________________________________________________
        _______________________________________________________________________
   b. Describe transcellular reabsorption. __________________________________________
        _______________________________________________________________________
        _______________________________________________________________________
        _______________________________________________________________________
   c. What kind of transport mechanisms are used for reabsorption? __________________
        _______________________________________________________________________
        _______________________________________________________________________
        _______________________________________________________________________
5. a. Identify two reasons that make secretion important.
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   - 

   b. What kind of transport mechanisms are used for secretion?

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**Renal Transport Mechanisms**

6. Identify 5 renal transport mechanisms.
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7. a. Describe the role of *primary active transport* with regard to sodium ions $\text{Na}^+$. 

   b. Describe the role of primary active transport with regard to potassium ($\text{K}^+$) and hydrogen ($\text{H}^+$) ion movement. 

   c. Why is $\text{Na}^+$ movement important with regard to movement across the membrane?

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8. a. The energy stored in the sodium ion electrochemical gradient is used to transport other molecules back toward the bloodstream (reabsorption). What nutrients are transported in this fashion?

   b. How does the sodium gradient affect hydrogen ion movement?
9. Describe the role of transporter proteins with regard to nutrient movement.

10. Describe ion movement through or between the cell membranes into the interstitial fluid.

11. a. What determines the direction of water movement?

11. b. Why does increased water reabsorption affect ion and urea movement?

**Reabsorption**

12. Identify reabsorption locations along the nephron.

13. Describe reabsorption at the proximal convoluted tubule.

14. a. Describe how the sodium gradient determines reabsorption.

14. b. How is this gradient maintained?

15. Describe reabsorption of glucose, amino acids, and vitamins.

16. Describe forces that facilitate reabsorption of bicarbonate ($HCO_3^-$).
17. Describe how sodium ion concentrations affect movement of other ions and nitrogenous wastes.

18. How does the ion and nitrogenous waste concentrations affect water movement?

19. Describe reabsorption along the descending limb of the loop of Henle.

b. Describe reabsorption along the ascending limb of the loop of Henle.

20. Describe reabsorption along the distal convoluted tubule.
21. Describe reabsorption via sodium/potassium pump activity along the collecting duct. Include hormonal influences in your description.

22. Where does secretion occur?

23. a. Describe \( \text{H}^+ \) and \( \text{NH}_4^+ \) ion secretion into the urine.

b. What affect does removal of these ions have on blood pH?

24. a. What solutes are secreted at the collecting duct?

b. Describe how potassium ions (\( \text{K}^+ \)) are secreted from the blood into the urine.
Summary of Filtrate Processing

25. a. What happens during early filtrate processing? ____________________________

b. Describe the filtrate condition by the time it reaches the distal convoluted tubule.

__________________________________________

__________________________________________

c. Contrast the osmolality of DCT filtrate and that of blood. ________________________

__________________________________________

d. Why is the reabsorption level through the DCT called “obligatory?” ________________

__________________________________________

e. Describe late filtrate processing. ____________________________

__________________________________________

c. _______________________________________

d. _______________________________________

e. _______________________________________

f. What regulates late filtrate processing? __________________________________________