

**BMD 330 and 335: Human Physiology**  
**Chapter 20 Objectives**

**The Urinary System: Fluid and Electrolyte Balance**

1. Explain the concept of balance.
2. Describe the different sources of body water input and output.
3. Explain the counter-current system and how it sets up osmolar gradients in the renal medulla.
4. Explain the control of water balance and osmolarity by antidiuretic hormone.
  - a. Describe the synthesis and release of ADH.
  - b. Describe the actions of ADH at principal cells in the distal tubules and collecting ducts.
  - c. Explain how the osmotic gradient in the renal medulla is necessary for water conservation.
5. Describe how aldosterone and atrial natriuretic peptide regulate plasma sodium levels. Include an explanation of the stimuli that release these hormones.
  - a. Describe the renin-angiotensin-aldosterone system.
  - b. Describe the juxtaglomerular apparatus.
6. Describe the major mechanisms whereby water and sodium balance influence mean arterial pressure.
  - a. Describe how angiotensin II affects mean arterial blood pressure.
  - b. Describe how mean arterial pressure affects renin release.
7. Explain the role of aldosterone in potassium balance.
8. Describe the major hormone systems that regulate calcium balance.
9. Describe how the cardiovascular system and urinary system work together to compensate for hemorrhage.
10. Describe various factors that influence acid-base balance.
  - a. Define pH. Define neutral, acidic, and basic (alkaline) solutions.
  - b. What is the normal pH of blood?
  - c. Define acidosis and alkalosis. Compare metabolic and respiratory components of each.
  - d. Describe the various sources of acids and bases
  - e. Describe the buffers as a first line of defense against acid-base disturbances
  - f. How does the respiratory system compensate for a metabolic disturbance in acid-base balance?
  - g. How does the body compensate for a respiratory disturbance in acid-base balance?
  - h. Describe the renal handling of  $H^+$  and  $HCO_3^-$