chapter 2

Basic Concepts and Processes

Objectives

AFTER STUDYING THIS CHAPTER, THE STUDENT WILL BE ABLE TO:

1. Discuss cellular physiology in relation to drug therapy.
2. Describe the main pathways and mechanisms by which drugs cross biologic membranes and move through the body.
3. Describe each process of pharmacokinetics.
4. Discuss the clinical usefulness of measuring serum drug levels.
5. Describe major characteristics of the receptor theory of drug action.
6. Differentiate between agonist drugs and antagonist drugs.
7. Describe drug-related and client-related variables that affect drug actions.
8. Discuss mechanisms and potential effects of drug–drug interactions.
9. Identify signs and symptoms that may occur with adverse drug effects on major body systems.
10. Discuss general management of drug overdose and toxicity.
11. Discuss selected drug antidotes.

Critical Thinking Scenario

Mrs. Green, an 89-year-old widow, lives alone and has recently started taking many heart medications. She prides herself on being independent and able to manage on her own despite failing memory and failing health. When you visit as a home health nurse, you assess therapeutic and adverse effects of her medications.

Reflect on:

- Considering Mrs. Green's age, what factors might alter the pharmacokinetics (absorption, distribution, metabolism, excretion) of the drugs she takes? What data will you collect to determine her risk?
- What psychosocial factors could affect the therapeutic and adverse effects of Mrs. Green's medications? What data will be important to collect before developing a plan for Mrs. Green?
- When clients are taking many medications, the risk for drug interactions and toxicity increases. Describe how you will develop a plan to research possible drug interactions for any client.

OVERVIEW

All body functions and disease processes and most drug actions occur at the cellular level. Drugs are chemicals that alter basic processes in body cells. They can stimulate or inhibit normal cellular functions and activities; they cannot add functions and activities. To act on body cells, drugs given for systemic effects must reach adequate concentrations in blood and other tissue fluids surrounding the cells. Thus, they must enter the body and be circulated to their sites of action (target cells). After they act on cells, they must be eliminated from the body.

How do systemic drugs reach, interact with, and leave body cells? How do people respond to drug actions? The answers to these questions are derived from cellular physiology, pathways and mechanisms of drug transport, pharmacokinetics, pharmacodynamics, and other basic concepts and processes. These concepts and processes form the foundation of rational drug therapy and the content of this chapter.

CELLULAR PHYSIOLOGY

Cells are dynamic, busy, "factories" (Fig. 2–1; Box 2–1). That is, they take in raw materials, manufacture various products required to maintain cellular and bodily functions, and deliver those products to their appropriate destinations in the body. Although cells differ from one tissue to another, their common characteristics include the ability to: