

chapter 40

Antifungal Drugs

Objectives

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

1. Describe characteristics of fungi and fungal infections.
2. Discuss antibacterial drug therapy and immunosuppression as risk factors for development of fungal infections.
3. Describe commonly used antifungal drugs in terms of indications for use, adverse effects, and nursing process implications.
4. Differentiate between adverse effects associated with systemic and topical antifungal drugs.
5. Differentiate among formulations of amphotericin B.
6. Teach clients about prevention and treatment of fungal infections.

Critical Thinking Scenario

John Morgan, 79 years of age, is diagnosed with prostate cancer. He has been receiving chemotherapy for the last 3 months. After his third course of treatment, he becomes neutropenic and an infection develops that is treated with two broad-spectrum antibiotics.

Reflect on:

- ▶ Why John is at risk for a fungal infection.
- ▶ Why a fungal infection in John is likely to be serious and systemic.
- ▶ What assessments you will make to detect a fungal infection.

OVERVIEW

Fungi are molds and yeasts that are widely dispersed in the environment and are either saprophytic (ie, obtain food from dead organic matter) or parasitic (ie, obtain nourishment from living organisms). Molds are multicellular organisms comprised of colonies of tangled strands. They form a fuzzy coating on various surfaces (eg, the mold that forms on spoiled food and the mildew that forms on clothing in damp environments). Yeasts are unicellular organisms. Some fungi, called dermatophytes, can grow only at the cooler temperatures of body surfaces. Other fungi, called dimorphic, can grow as molds outside the body and as yeasts in the warm temperatures of the body. As molds, these fungi produce spores that can persist indefinitely in the environment and be carried by the wind to distant locations. When these mold spores enter the body, most often by inhalation, they rapidly become yeasts that can invade body tissues. Dimorphic fungi include a number of human pathogens such as those that cause blastomycosis, histoplasmosis, and coccidioidomycosis.

Fungi that are pathogenic in humans exist in soil, decaying plants, and other environmental habitats or as part of the endogenous human flora. For example, *Candida albicans* organisms are part of the normal microbial flora of the skin, mouth, gastrointestinal (GI) tract, and vagina. Growth of *Candida* organisms is normally restrained by intact immune mechanisms and bacterial competition for nutrients. When these restraining forces are altered (eg, by suppression of the immune system or antibacterial drug therapy), fungal overgrowth and opportunistic infection can occur. In addition, some fungi have characteristics that enhance their ability to cause disease. *Cryptococcus neoformans* organisms, for example, can become encapsulated, which allows them to evade the normal immune defense mechanism of phagocytosis. *Aspergillus* organisms produce protease, an enzyme that allows them to destroy structural proteins and penetrate body tissues.

Structurally, fungi are larger and more complex than bacteria. They have a thick, rigid cell wall, of which one of the components is a polysaccharide called glucan. Glucan is formed by the fungal enzyme, beta-(1,3)-D-glucan synthetase. Fungi also