



Figure 8-42 The morphology of *Candida* infections. **A**, Severe candidiasis of the distal esophagus. **B**, Hematoxylin and eosin stain of esophageal candidiasis reveals the dense mat of *Candida*. **C**, Characteristic pseudohyphae and budding yeast of *Candida*. (C. Courtesy Dr. Dominick Cuvuoti, Department of Pathology, University of Texas Southwestern Medical School, Dallas, Texas).

candidal infection seen in the perineum of infants, the region in contact with wet diapers.

Invasive candidiasis is caused by bloodborne dissemination of organisms to various tissues or organs. Common patterns include (1) renal abscesses, (2) myocardial abscesses and endocarditis, (3) brain microabscesses and meningitis, (4) endophthalmitis (virtually any eye structure can be involved), and (5) hepatic abscesses. In any of these locations, depending on the immune status of the infected person, the fungus may evoke little inflammation cause the usual suppurative response, or occasionally produce granulomas. People with acute leukemias who are profoundly neutropenic after chemotherapy are particularly prone to developing systemic disease. *Candida* endocarditis is the most common fungal endocarditis, usually occurring in the setting of prosthetic heart valves or in intravenous drug abusers. In the latter group the tricuspid valve is involved.

Cryptococcosis

Two species of cryptococcus are known to cause disease in humans, *C. neoformans* and *C. gattii*, both of which grow as encapsulated yeasts. It has long been recognized that while *C. neoformans* may cause meningoencephalitis in otherwise healthy individuals, it more frequently presents as an opportunistic infection in people with AIDS, leukemia, lymphoma, systemic lupus erythematosus, or sarcoidosis, as well as in immunosuppressed transplant recipients. Many of these patients receive high-dose corticosteroids, a

major risk factor for *C. neoformans* infection. *Cryptococcus neoformans* is present in the soil and in bird (particularly pigeon) droppings and infects people when it is inhaled.

C. gattii was an obscure infectious agent until 1999, when it was identified as the cause of an outbreak of cryptococcal disease in the American Pacific Northwest and contiguous areas of British Columbia. It has subsequently been linked to cryptococcal infections worldwide. Because most current tests used to diagnose cryptococcal infections (discussed later) do not distinguish between *C. gattii* and *C. neoformans*, the true incidence of infections caused by these two agents is currently uncertain. Based on findings from areas where *C. gattii* is now specifically tested for, it appears that *C. gattii* is more likely than *C. neoformans* to cause disease in immunologically normal individuals and to present with large lesions that produce mass effects or that mimic the radiologic appearance of a neoplasm. *C. gattii* is associated with certain species of trees, is found in soil, and like *C. neoformans* is acquired by inhalation.

Pathogenesis. *Cryptococcus* has several virulence factors that enable it to evade host defenses, as follows:

- **Polysaccharide capsule.** Glucuronoxylomannan inhibits phagocytosis by alveolar macrophages, leukocyte migration, and recruitment of inflammatory cells. *C. neoformans* can undergo phenotypic switching, which leads to changes in the structure and size of the capsular polysaccharide, providing a means to evade immune responses.