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Deep Fungal Infections

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Diagnosis	Causal Agent	Epidemiology	Clinical Features	Pathology	Source of Infection
Histoplasmosis	<i>Histoplasma capsulatum</i>	Eastern Great Lakes; Ohio, Mississippi, and Missouri riverbeds	Oral ulcers; erythematous papules and nodules; pulmonary involvement in immunocompromised patients	Small intracellular yeasts (2–3×3–5 μm) with narrow-neck budding; pseudocapsule but not true capsule	Exposure to bird or bat excrement; cave exploring; most common endemic mycosis in AIDS patients
Blastomycosis (North American blastomycosis)	<i>Blastomyces dermatitidis</i>	Upper Great Lakes, Ohio River, Mississippi River, southeastern United States	Papulopustular and verrucous plaques; central ulceration on exposed skin (face)	Solitary broad-based budding, thick-wall yeasts (7–15 μm)	Primary pulmonary infection with secondary disease to skin, bones, and genitourinary system
Coccidioidomycosis	<i>Coccidioides immitis</i>	Southwestern United States, San Joaquin valley, Mexico, Central and South America	Papules, pustules, plaques, abscesses, and sinus tracts on the face; papules resemble molluscum contagiosum in HIV-infected patients	Endospores with thick walls containing spherules (30–60 μm)	Farmers, construction workers
Paracoccidioidomycosis (South American blastomycosis)	<i>Paracoccidioides brasiliensis</i>	Central and South America	Painful ulcerative and verrucous plaques on the face and nasal and oral mucosa	Multiple narrow-based budding yeasts (5–60 μm) resembling a mariner's wheel	Dissemination to the spleen, central nervous system, bones, and adrenal glands

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Diagnosis	Causal Agent	Epidemiology	Clinical Features	Pathology	Source of Infection
Chromomycosis (chromoblastomycosis)	<i>Cladosporium carrionii</i> , <i>Fonsecaea compacta</i> , <i>Fonsecaea pedrosoi</i> , <i>Phialophora verrucosa</i> , <i>Rhinoctadiella aquaspera</i>	Tropical and subtropical climates in United States, Europe, and Canada	Verrucous plaque on extremities; annular plaques with central scarring	Round brown pigmented bodies (copper pennies) (5–15 μm)	Farmers, miners, and workers in rural areas
Sporotrichosis (rose gardener's disease)	<i>Sporothrix schenckii</i>	Endemic worldwide: Unites States (Wisconsin largest outbreak), Mexico, Central America, South America, and South Africa	Single papule on the site of inoculation that becomes ulcerated with purulent drainage, on face (localized form); nodules and ulcers along the path of lymphatic drainage, on arms	Cigar-shaped budding yeast difficult to identify; asteroid bodies present	Gardeners growing orchids and roses; veterinary care; woodworking
Mycetoma	Eumycetoma: <i>Madurella mycetomi</i>	Tropical and subtropical climates; cases have been reported worldwide	Draining sinuses containing grains on foot, legs, or hands	Suppurative and granulomatous inflammation; grains (tightly packed colonies of organisms)	Rural workers; Grocott-Gomori methenamine-silver stain; black or yellow grains
Aspergillosis	<i>Aspergillus</i> species	Soil saprophyte found in decaying vegetation; opportunistic infection	Necrotic papulonodules; subcutaneous nodules; areas of trauma (eg, intravenous cannulas, venipuncture wounds); toenails	Septate hyphae with dichotomous acute angle branching	Allergic bronchopulmonary fungus ball, and invasive aspergillosis; immunocompromised patients

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Hyalohyphomycosis	<i>Fusarium</i> species, <i>Fusarium solani</i>	Opportunistic infection	Umbilicated or necrotic papules, pustules, or abscesses; subcutaneous nodules on extremities in site of trauma, burns, or onychomycosis	Septate hyphae with both 45°–90° branching	Immunocompromised patients; neutropenia; keratitis; onychomycosis
Zygomycosis (mucormycosis)	<i>Mucor</i> species, <i>Rhizopus</i> species, <i>Absidia</i> species	Soil and decaying vegetation; opportunistic infection	Inhalation ↓ respiratory infection ↓ dissemination; necrotic lesions; black scar on nasal mucosa or palate; rhino-orbital-cerebral mucormycosis	Nonseptate, wide hyphae branching at >90° angle	Diabetes mellitus, leukemia, malnutrition, or trauma; natural disaster; combat associated; 50% mortality rate
Cryptococcosis	<i>Cryptococcus neoformans</i>	Worldwide distribution; avian (pigeon) droppings	Ulceration; cellulitis; molluscumlike lesions	Encapsulated yeast; thick capsule; vary in size; mucicarmine highlights capsule; india ink; reproduction by budding; no inflammation	90% of cases localized in the lungs; skin lesions in 15% of patients with disseminated infection; meningitis in immunocompromised patients

Abbreviation: HIV, human immunodeficiency virus.

Practice Questions

- 1. The fungus classically associated with erythematous nodules along the lymphatics on the extremities is:**
 - a. chromomycosis
 - b. coccidioidomycosis
 - c. mycetoma
 - d. paracoccidioidomycosis
 - e. sporotrichosis

- 2. The fungal infection that invades blood vessels of diabetics by broad nonseptate hyphae is:**
 - a. aspergillosis
 - b. candidiasis
 - c. cryptococcosis
 - d. hyalohyphomycosis
 - e. zygomycosis

- 3. A rural farmer presents with verrucous plaques on his hand of several weeks' duration. A biopsy revealed round, brown, pigmented bodies resembling copper pennies in the dermis. Which of the following is the most likely causative organism?**
 - a. *Blastomyces dermatitidis*
 - b. *Fonsecaea pedrosoi*
 - c. *Fusarium solani*
 - d. *Madurella mycetomi*
 - e. *Paracoccidioides brasiliensis*

- 4. Mucicarmine is most helpful to identify gelatinous capsules in:**
 - a. blastomycosis
 - b. candidiasis
 - c. cryptococcosis
 - d. mucormycosis
 - e. sporotrichosis

- 5. A student in a town near the Ohio River reports a headache, fever, nonproductive cough, and papular skin eruption. He has enjoyed the weekends exploring caves. The pathology from a skin biopsy showed small intracellular yeast forms with pseudocapsules. Which of the following is the most likely pathogen?**
 - a. *Aspergillus fumigatus*
 - b. *Coccidioides immitis*
 - c. *Histoplasma capsulatum*
 - d. *Paracoccidioides brasiliensis*
 - e. *Sporothrix schenckii*

Fact sheets and practice questions will be posted monthly. Answers are posted separately at www.cutis.com.