

## Medical Mycology

By Adriana Schmidt, MD, and Natalie M. Curcio, MD, MPH. (Updated July 2015\*)

SUPERFICIAL MYCOSES*	ORGANISM	CLINICAL	HISTO/KOH	TREATMENT
<b>Pityriasis versicolor</b>	Malessezia furfur	Hypo- or hyper-pigmented macules	Spaghetti & meatballs: short hyphae + yeast	Antifungal shampoos and/or PO therapy
<b>Tinea nigra palmaris</b>	Hortaea werneckii (formerly Phaeoanellomyces werneckii)	Brown-black non-scaly macules	Branching septate hyphae + budding yeast	Topical imidazoles or allylamines
<b>Black piedra</b>	Piedraia hortae	Hard firm black concretions	Dark hyphae around acrospores	Cut hair off, PO terbinafine, imidazoles, or triazoles
<b>White piedra</b>	Trichosporon ovoides or inkin (formerly beigellii)	Soft loose white concretions	Blastoconidia, arthroconidia	
<b>Fluorescent small spore ectothrix: "Cats And Dogs Sometimes Fight &amp; Growl"</b>	Microsporum Canis M. audouinii M. distortum T. schoenleinii M. ferrugineum +/- gypseum		KOH: spores on outside of the hair shaft; Wood's lamp --> yellow fluorescence	
<b>Large spore endothrix</b>	Trichophyton spp. (T. tonsurans in North America; T. violaceum in Europe, Asia, parts of Africa).		KOH: spores within hair shaft	Topical antifungals; PO antifungals for T. manuum, capitis, unguium
<b>Tinea corporis</b>	T. rubrum > T. mentag. Majocchi's granuloma: T. rubrum			
<b>T. pedis</b>	Moccasin: T. rubrum, E. floccosum. Interdigital/vesicular: T. mentag			
<b>T. unguium</b>	Distal lateral, proximal and proximal white subungual: T. rubrum. White superficial: T. mentag. HIV: T. rubrum			

SUBQ MYCOSES**	ORGANISM	TRANSMISSION	CLINICAL	HISTO/KOH	TREATMENT
<b>Sporotrichosis</b>	Sporothrix schenckii	Inoculation Inhalation	SubQ nodules; lymphatic spread	"Cigar bodies" or round yeast	Itraconazole, KI, amphotericin B
<b>Mycetoma</b>	Eumycotic: Pseudoallescheria boydii Actinomycotic: Nocardia and Actinomadura	Penetrating wound in foot (70%) > hand, thorax, scalp	Triad: tumefaction, draining sinuses, grains (aggregates of organisms)	Grains + thick hyphae (eumycotic) & thin filaments (actinomycotic)	Eumycotic: excision, itraconazole Actino: trimetha/sulfa
<b>Chromoblastomycosis (verrucous dermatitis)</b>	Fonsecaea Pedrosoi, Cladophialophora carrionii (> 90%)	Direct inoculation to foot/LE; farmers	Verrucous or granulomatous plaque or nodule w/ central clearing; SCC in chronic	Pigmented "copper pennies" (medlar or sclerotic bodies)	Excision, Cryotherapy, Itraconazole +/- flucytosine, CO <sup>2</sup> laser
<b>Lobomycosis (keloidal blastomycosis)</b>	Lacazia loboi (formerly Loboia loboi)	Water, soil, dolphins; Brazil, Caribbean	Painless keloids, nodules, verrucous lesions on face/UE, ear	Thick-walled spherical organisms in "chain of coins", not culturable	Excision (antifungals ineffective)

DIMORPHIC FUNGI	ORGANISM	TRANSMISSION	CLINICAL	HISTO/KOH	TREATMENT
<b>Histoplasmosis (Darling's Disease)</b>	H.capsulatum var. capsulatum (US)	Inhalation of spores from soil >>> 1° inoc.	1° pulmonary: pneumonitis → arthritis & E.N in 10%; rare skin lesions with dissemination	Tiny yeast forms within cytoplasm of macrophages; no capsule	Itraconazole Ampho B for severe
<b>Blastomycosis (Gilchrist's Disease)</b>	Blastomyces dermatitidis	Inhalation of spores from soil, and primary cutaneous (Gilchrist's)	Well-demarcated papules/pustules/plaques	Broad-based, budding yeast	Itraconazole Ampho B

DIMORPHIC FUNGI**	ORGANISM	TRANSMISSION	CLINICAL	HISTO/KOH	TREATMENT
<b>Paracoccidiomycosis (S. American Blastomycosis)</b>	Paracoccidioides brasiliensis	Inhalation of spores from soil; Male agricultural workers	Systemic or 1° nasal/oral mucosal ulcers or verrucous	"Mariner's wheel"	Itraconazole Ketaconazole Ampho B
<b>Coccidiomycosis (San Joaquin Valley Fever)</b>	Coccidioides immitis	Inhalation of spores from soil	Facial pink papules, verrucous nodules or SQ abscesses; E.N.	Spherules containing endospores	Itraconazole; Ampho B or Fluconazole (meningitis)



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OPPORTUNISTIC	ORGANISM	TRANSMISSION	CLINICAL	HISTO/KOH	TREATMENT
<b>Cryptococcus</b>	<i>C. neoformans</i> var. <i>neoformans</i> and <i>C. gatti</i>	Inhalation of spores or 1° cutaneous, ↑ disseminated dz in AIDS	Head and neck; ulceration, cellulitis, molluscum-like	Mucinous, encapsulated yeast	Fluconazole Ampho B +/- flucytosine (HIV)
<b>Penicilliosis</b>	<i>Penicillium marneffei</i> (dimorphic)	Inhalation of spores from bamboo rats	Molluscum-like skin lesions	Oval yeast w/cross walls; parasitized macrophages	Itraconazole Ampho B Excision
<b>Fusariosis</b>	<i>Fusarium</i> sp.	Burn patients Neutropenia Trauma		Septate hyphae 45° branching; "banana shaped macroconidia"	Ampho B + 5FC Voriconazole
<b>Aspergillosis</b>	1° cutan.: <i>A. flavus</i> ; Disseminated: <i>A. fumigatus</i>	Burn patients Transplant/GVHD Aflatoxins Neutropenia	IV catheter, necrotic nodules	Septate hyphae 45° w/ phialides + conidia in chains; Splendore-Hoeppli phenomenon	Ampho B Voriconazole Itraconazole (nail disease)
<b>Zygomycosis</b>	<i>Rhizopus</i> <i>Mucor</i> <i>Absidia</i>	Diabetes DKA/burns Neutropenia Transplant Malnutrition	Ulceration, cellulitis, and necrotic abscesses; sinuses, unilateral facial edema	Wide angle 45-90° branching non-septate broad hyphae; <i>Rhizopus</i> → sporangia	Excision Ampho B
<b>Phaeohyphomycosis</b>	<i>Alternaria</i> <i>Exophiala</i> <i>Phialophora</i> <i>Curvularia</i> <i>Bipolaris</i>	Invasive disease in immunocompromised; Cutaneous dz in immunocompetent	SubQ cysts, ulcerated plaques, hemorrhagic pustules, necrotic papulonodules	Dematiaceous (black or pigmented) dark yeast with pseudohyphae-like elements; <i>Alternaria</i> ; hand grenade; Fontana-Masson +	Excision Itraconazole
<b>Rhinosporidiosis</b>	<i>Rhinosporidium seeberi</i> [protozoa]	Direct inoculation	Wart-like in nasal mucosa, eye, mouth	BIG raspberry-like spherules	Excision Dapsone, Ampho B injection
<b>Protothecosis</b>	<i>Prototheca wickerhamii</i> [Algae]	Direct inoculation after trauma	Various skin, Olecranon bursitis	Morula 8-20 μm (sphere of endospores) like "soccer ball"	Ampho B Excision

\***SUPERFICIAL MYCOSES** = invade *S. corneum*, hair, nails

\*\***SUBCUTANEOUS MYCOSES** = deeper penetration into dermis or subq, usually after trauma (inoculation) > inhalation.

\*\*\***DIMORPHIC FUNGI** = molds in nature and yeast in living tissue.

### Abbreviations:

**WW:** worldwide

**Vori:** Voriconazole

**Top.:** topical

**KI:** potassium iodide

\*Reviewed and updated July 2015 by: Alina Goldenberg, MD, Emily deGolian, MD, and Sharon Jacob, MD.