FUNGUS	MORPHOLOGY	LOCATION OF DISEASE	PRIMARY DEFENSE	PATHOGENIC or OPPORTUNISTIC	DIAGNOSIS & TREATMENT	STUFF TO KNOW
Dermatophytes (tinea)	molds, spores	superficial (cutaneous)	intact skin	(only for systemic) -can be systemic in immunocompr.	dissolve skin scrapings in KOH (digests keratin), or Wood's light exam b/c UV light makes them fluoresce → candida won't do this! Rx: topical azoles systemic griseofulvin azoles, allylamines	omnipresent all possess keratinases - breaks down keratin in stratum corneum completely reversible! Pathogenesis: spores shed on skin adhere to skin, germinate and invade; some may invade deeper layers of skin Disease: Dermatophytosis 1. Tinea corporis (ringworm) - well demarcated itchy circle 2. Tinea pedis (athlete's food) 3. Tinea cruris (jock itch) 4. Tinea capitis (scalp and hair) 5. Tinea unguium (onychomycosis - nails) - thickened, discolored, brittle
Malassezia furfur	yeast	superficial (cutaneous)	intact skin	(only for systemic)	KOH prep, UV fluorescence Rx: topical selenium sulfide (found in dandruff shampoo) or azoles	omnipresent, part of normal skin flora Pathogenesis: proliferate in lipids and sweat - appears in adolescence Disease: Pityriasis versicolor - hypo- or hyperpigmented patches on skin
Sporothrix schenkii	dimorphic	subcutaneous	intact skin	(only for systemic) -can be systemic in immunocompr. Can't follow lesions because coming from inside	culture of tissue or drainage Tx: ketoconazole itraconazole amphotericin	worldwide distribution in soil Pathogenesis: grows as mold with hyphae in soil, switches to yeast in human host (no keratinases) splinters inoculate fungus via thorn into skin, infection spreads and enters lymphatics - eventually blocks lymphatics, causes granulomatous lesions Disease: Sporotrichosis - hard nodule at infection site, as fungus spreads via lymphatics, result is nodules along lymphatic like knots on a rope immense, slow granulomatous response
Histoplasma capsulatum	dimorphic	systemic	lymphocyte function	pathogenic	(+) histoplasmin antigen test only confirms exposure! exposure + CXR shows granulomas + antibodies, or tissue culture for disseminated, give amphotericin B	worldwide distribution in soil with lots of nitrogen from bird/bat crap Pathogenesis: spores are inhaled from soil, transform to yeast in lungs phagocytosis by macrophages results in granulomatous response intracellular multiplication Disease: Histoplasmosis 1. self-limited, 5% have flu-like symptoms - no treatment necessary 2. chronic pulmonary disease, usually in people with old lung probs 3. disseminated (0.01%) - fever, wasting, pancytopenia may be reactivation of previous infection in AIDS patients

Coccidioides immitis	dimorphic	systemic	lymphocyte function	pathogenic	coccidioidin antigen test not reliable; use smear and culture of pus (ew) Rx: disseminated or pulmonary - amphotericin B, fluconazole, itraconazole	likes hot dry locales, especially soil or desert soil organisms aerosolize and are inhaled Pathogenesis: spores inhaled and grow in lung - become "spherules" which burst and release hundreds of endospores spherules get mononuclear cell response, endospores get neutrophils Disease: Coccidioidomycosis 1. 60% are asymptomatic, no treatment necessary 2. 40% bad pulmonary infection - fever, cough, malaise, sputum 3. disseminated disease more common in men, pregnant women, dark-skinned, immunocomp. - skin lesions, bone lesions, meningitis
Blastomyces dermatitidis	dimorphic	systemic	lymphocyte function	pathogenic	smear or culture of infected site Rx: amphotericin B, ketoconazole, itraconazole	likes humid, woody, cave-like areas - prefers decaying organic matter associated with spelunking, peanut harvesting, camping, etc. Pathogenesis: spores inhaled into lungs, transforms into yeast in host neutrophilic and granulomatous response in lung Disease: Blastomyosis 1. usually asymptomatic 2. disseminated is really bad - pigmented skin nodules, bone lesions, UG symptoms like scrotal ulcers, prostatitis
Cryptococcus neoformans	yeast	systemic	lymphocyte function, humoral immunity	opportunistic	cryptococcal antigen test great for testing (capsule) - from serum or CSF Rx: amphotericin B fluconazole	comes from pigeon crap, omnipresent has thick polysaccharide capsule, great for testing Pathogenesis: aerosolized yeasts inhaled into lungs - antibodies against capsule important in host defense has tropism for brain and CNS Disease: Cryptococcosis 1. immunocompetent - self-limited, but can become more severe 2. immunocompromised - meningoencephalitis = fever, headache, stiff neck, loss of vision. Can be acute or chronic.

Candida species	yeast	systemic	intact skin, lymphocyte neutrophils	opportunistic	gram stain, culture Rx: nystatin (local) amph. B, fluconazole or caspofungin for systemic	part of normal flora, likes warm moist areas, like mouth, vagina, anus infancy, pregnancy, oral contraceptives and antibiotics predispose to infection Pathogenesis: intact skin and normal mucosal pH/flora protect, but if skin is breached, superficial infection can result - invades uncolonized areas and grows -secrete hydrolases, proteases, phospolipases - kills connective tissue -can survive low pH, bloodstream, on mucosal surfaces -can adhere well to prosthetic surfaces like dentures - biofilm -<u>neutrophils</u> most important - need myeloperoxidase, etc. -complement and IgG also necessary but not sufficient -lymphocytes protect against skin & mucosal surfaces -<u>hyphal</u> phase is the invasive phase! No hyphae, no virulence. hyphal form protects after phagocytosis, allowing escape Disease: Candidiasis 1. mucocutaneous - vaginitis (yeast infection), oral thrush, balanitis, etc 2. urinary tract - dysuria, fever 3. disseminated - <u>not in AIDS patients!!</u> need to have lymphocyte cytokines to recruit phagocytes - fever, renal dysfunction b/c blocks small vessels, skin lesions
Aspergillus fumigatus	molds, spores	systemic	neutrophil function	opportunistic	stain and culture of biopsy specimen Rx: corticosteroids for allergy amphotericin B, itraconazole, or caspofungin for invasive	ubiquitous in nature, found in soil, air, compost, etc. no yeast phase, grows hyphae Pathogenesis: spores are inhaled into lung -neutrophils are of primary importance, so affects chemo patients more HIV patients Disease: Aspergillosis 1. hypersensitivity in airways, IgE mediated eosinophilia - wheezing 2. massive growth (aspergilloma ball) in pre-existing lung cavitations hemoptysis (coughing up blood) 3. invasive pulmonary - fever, dyspnea, pulmonary consolidation
Mucorales species (rhizopus)	molds, spores	systemic	neutrophil function	opportunistic	stain and culture of biopsy specimen Rx: correct hyperglycemia, amphotericin B for immunocomp.	likes warm, acidic, sugary organic decay - moldy bread no yeast phase, grows hyphae Pathogenesis: spores are inhaled into alveoli and nasal turbinates -usually this is OK, but if unchecked by immune system, can spread -neutrophils most important in host defense Disease: Mucormycosis (aka phycomycosis, zygomycosis) 1. horrible systemic infection - mold invades sinuses, nerves, bone mortality 50%! limited to acidotic diseases - diabetes, diarrhea, uremia, salicylates causes necrotizing sinusitis, rhinocerebral and pulmonary issues