

# Chapter 189

## Yeast Infections: Candidiasis, Tinea (Pityriasis) Versicolor, and *Malassezia* (*Pityrosporum*) Folliculitis

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### REFERENCES

1. Segal E: Candida, still number one—what do we know and where are we going from there? *Mycoses* **48**(Suppl 1):3-11, 2005
2. Farah CS, Ashman RB, Challacombe SJ: Oral candidosis. *Clin Dermatol* **18**(5):553-562, 2000
3. Fidel PL Jr, Sobel JD: Immunopathogenesis of recurrent vulvovaginal candidiasis. *Clin Microbiol Rev* **9**(3):335-348, 1996
4. Grigoriou O et al: Prevalence of clinical vaginal candidiasis in a university hospital and possible risk factors. *Eur J Obstet Gynecol Reprod Biol* **126**(1):121-125, 2006
5. Patton LL, van der Horst C: Oral infections and other manifestations of HIV disease. *Infect Dis Clin North Am* **13**(4):879-900, 1999
6. de Repentigny L, Lewandowski D, Jolicoeur P: Immunopathogenesis of oropharyngeal candidiasis in human immunodeficiency virus infection. *Clin Microbiol Rev* **17**(4):729-759, table of contents, 2004
7. Pfaller MA, Diekema DJ: Epidemiology of invasive candidiasis: A persistent public health problem. *Clin Microbiol Rev* **20**(1):133-163, 2007
8. Vazquez JA, Candidiasis SJ: *Clinical Mycology*, edited by PP Dismukes WE, JD Sobel. Oxford Univers, 2003, pp. 143-187.
9. Yang YL: Virulence factors of Candida species. *J Microbiol Immunol Infect* **36**(4):223-228, 2003
10. De Bernardis F et al: Biotyping and virulence properties of skin isolates of Candida parapsilosis. *J Clin Microbiol* **37**(11):3481-3486, 1999
11. Kullberg BJ, Oude Lashof AM: Epidemiology of opportunistic invasive mycoses. *Eur J Med Res* **7**(5):183-191, 2002
12. Sullivan DJ et al: Comparison of the epidemiology, drug resistance mechanisms, and virulence of Candida dubliniensis and Candida albicans. *FEMS Yeast Res* **4**(4-5):369-376, 2004
13. Pappas PG et al: A prospective observational study of candidemia: Epidemiology, therapy, and influences on mortality in hospitalized adult and pediatric patients. *Clin Infect Dis* **37**(5):634-643, 2003
14. Pappas PG: Invasive candidiasis. *Infect Dis Clin North Am* **20**(3):485-506, 2006
15. Appleton SS: Candidiasis: Pathogenesis, clinical characteristics, and treatment. *J Calif Dent Assoc* **28**(12):942-948, 2000
16. Belazi M et al: Oral Candida isolates in patients undergoing radiotherapy for head and neck cancer: Prevalence, azole susceptibility profiles and response to antifungal treatment. *Oral Microbiol Immunol* **19**(6):347-351, 2004
17. McCullough MJ, Savage NW: Oral candidosis and the therapeutic use of antifungal agents in dentistry. *Aust Dent J* **50**(4 Suppl 2):S36-S39, 2005
18. Webb BC, Thomas CJ, Whittle T: A 2-year study of Candida-associated denture stomatitis treatment in aged care subjects. *Gerodontology* **22**(3):168-176, 2005
19. Wilson J: The aetiology, diagnosis and management of denture stomatitis. *Br Dent J* **185**(8):380-384, 1998
20. Ferrer J: Vaginal candidosis: Epidemiological and etiological factors. *Int J Gynaecol Obstet* **71**(Suppl 1):S21-S27, 2000
21. Haefner HK: Current evaluation and management of vulvovaginitis. *Clin Obstet Gynecol* **42**(2):184-195, 1999
22. MacDonald TM et al: The risks of symptomatic vaginal candidiasis after oral antibiotic therapy. *Q J Med* **86**(7):419-424, 1993
23. Spinillo A et al: Epidemiologic characteristics of women with idiopathic recurrent vulvovaginal candidiasis. *Obstet Gynecol* **81**(5 (Pt 1)):721-727, 1993
24. Owen MK, Clenney TL: Management of vaginitis. *Am Fam Physician* **70**(11):2125-2132, 2004
25. Sobel JD: Vulvovaginal candidosis. *Lancet* **369**(9577):1961-1971, 2007

26. Pariser DM: Cutaneous candidiasis. A practical guide for primary care physicians. *Postgrad Med* **87**(6):101-103, 106-108, 1990
27. Kazaks EL, Lane AT: Diaper dermatitis. *Pediatr Clin North Am* **47**(4):909-919, 2000
28. Giandoni MB, Grabski WJ: Cutaneous candidiasis as a cause of delayed surgical wound healing. *J Am Acad Dermatol* **30**(6):981-984, 1994
29. Hay RJ: Yeast infections. *Dermatol Clin* **14**(1):113-124, 1996
30. Elewski BE: Onychomycosis: Pathogenesis, diagnosis, and management. *Clin Microbiol Rev* **11**(3):415-429, 1998
31. Kirkpatrick CH: Chronic mucocutaneous candidiasis. *J Am Acad Dermatol* **31**(3 Pt 2):S14-S17, 1994
32. Kirkpatrick CH: Chronic mucocutaneous candidiasis. *Eur J Clin Microbiol Infect Dis* **8**(5):448-456, 1989
33. Herrod HG: Chronic mucocutaneous candidiasis in childhood and complications of non-Candida infection: A report of the Pediatric Immunodeficiency Collaborative Study Group. *J Pediatr* **116**(3):377-382, 1990
34. Durandy A et al: Mannan-specific and mannan-induced T-cell suppressive activity in patients with chronic mucocutaneous candidiasis. *J Clin Immunol* **7**(5):400-409, 1987
35. Richardson MD: Changing patterns and trends in systemic fungal infections. *J Antimicrob Chemother* **56**(Suppl 1):i5-i11, 2005
36. Wright WL, Wenzel RP: Nosocomial Candida. Epidemiology, transmission, and prevention. *Infect Dis Clin North Am* **11**(2):411-425, 1997
37. Kressel B, Szweczyk C, Tuazon CU: Early clinical recognition of disseminated candidiasis by muscle and skin biopsy. *Arch Intern Med* **138**(3):429-433, 1978
38. Alexander BD: Diagnosis of fungal infection: New technologies for the mycology laboratory. *Transpl Infect Dis* **4**(Suppl 3):32-37, 2002
39. Odabasi Z et al: Beta-D-glucan as a diagnostic adjunct for invasive fungal infections: Validation, cutoff development, and performance in patients with acute myelogenous leukemia and myelodysplastic syndrome. *Clin Infect Dis* **39**(2):199-205, 2004
40. Pappas PG et al: Clinical practice guidelines for the management of candidiasis: 2009 update by the Infectious Diseases Society of America. *Clin Infect Dis* **48**(5):503-535, 2009
41. Chandrasekar PH, Sobel JD: Micafungin: A new echinocandin. *Clin Infect Dis* **42**(8):1171-1178, 2006
42. Vazquez JA, Sobel JD: Anidulafungin: A novel echinocandin. *Clin Infect Dis* **43**(2):215-222, 2006
43. Sobel JD: Controversial aspects in the management of vulvovaginal candidiasis. *J Am Acad Dermatol* **31**(3 Pt 2):S10-S13, 1994
44. Welsh O, Vera-Cabrera L, Welsh E: Onychomycosis. *Clin Dermatol* **28**(2):151-159, 2010
45. Keating G, Figgitt D: Caspofungin: A review of its use in oesophageal candidiasis, invasive candidiasis and invasive aspergillosis. *Drugs* **63**(20):2235-2263, 2003
46. Hirai A et al: *Malassezia nana* sp. nov., a novel lipid-dependent yeast species isolated from animals. *Int J Syst Evol Microbiol* **54**(Pt 2):623-627, 2004
47. Sugita T et al: A new yeast, *Malassezia yamatoensis*, isolated from a patient with seborrheic dermatitis, and its distribution in patients and healthy subjects. *Microbiol Immunol* **48**(8):579-583, 2004
48. Sugita T et al: Description of a new yeast species, *Malassezia japonica*, and its detection in patients with atopic dermatitis and healthy subjects. *J Clin Microbiol* **41**(10):4695-4699, 2003
49. Gupta AK et al: Skin diseases associated with *Malassezia* species. *J Am Acad Dermatol* **51**(5):785-798, 2004
50. Batra R et al: *Malassezia* Baillon, emerging clinical yeasts. *FEMS Yeast Res* **5**(12):1101-1113, 2005
51. Gueho E, Midgley G, Guillot J: The genus *Malassezia* with description of four new species. *Antonie Van Leeuwenhoek* **69**(4):337-355, 1996
52. Cafarchia C, Otranto D: Association between phospholipase production by *Malassezia pachydermatis* and skin lesions. *J Clin Microbiol* **42**(10):4868-4869, 2004
53. Chang HJ et al: An epidemic of *Malassezia pachydermatis* in an intensive care nursery associated with colonization of health care workers' pet dogs. *N Engl J Med* **338**(11):706-711, 1998
54. Morris DO: *Malassezia pachydermatis* carriage in dog owners. *Emerg Infect Dis* **11**(1):83-88, 2005
55. Crespo Erchiga V et al: *Malassezia globosa* as the causative agent of pityriasis versicolor. *Br J Dermatol* **143**(4):799-803, 2000
56. Niamba P et al: Is common neonatal cephalic pustulosis (neonatal acne) triggered by *Malassezia sympodialis*? *Arch Dermatol* **134**(8):995-998, 1998

57. Bernier V et al: Skin colonization by *Malassezia* species in neonates: A prospective study and relationship with neonatal cephalic pustulosis. *Arch Dermatol* **138**(2):215-218, 2002
58. Levin NA: Beyond spaghetti and meatballs: Skin diseases associated with the *Malassezia* yeasts. *Dermatol Nurs* **21**(1):7-13, 51; quiz 14, 2009
59. Sunenshine PJ, Schwartz RA, Janniger CK: Tinea versicolor. *Int J Dermatol* **37**(9):648-655, 1998
60. Nakabayashi A, Sei Y, Guillot J: Identification of *Malassezia* species isolated from patients with seborrhoeic dermatitis, atopic dermatitis, pityriasis versicolor and normal subjects. *Med Mycol* **38**(5):337-341, 2000
61. Gupta AK, Bluhm R, Summerbell R: Pityriasis versicolor. *J Eur Acad Dermatol Venereol* **16**(1):19-33, 2002
62. Schmidt A: *Malassezia furfur*: A fungus belonging to the physiological skin flora and its relevance in skin disorders. *Cutis* **59**(1):21-24, 1997
63. Maysers P et al: Pityriacitrin – an ultraviolet-absorbing indole alkaloid from the yeast *Malassezia furfur*. *Arch Dermatol Res* **294**(3):131-134, 2002
64. Mendez-Tovar LJ: Pathogenesis of dermatophytosis and tinea versicolor. *Clin Dermatol* **28**(2):185-189, 2010
65. Crespo-Erchiga V, Florencio VD: *Malassezia* yeasts and pityriasis versicolor. *Curr Opin Infect Dis* **19**(2):139-147, 2006
66. Sunenshine PJ, Schwartz RA, Janniger CK: Tinea versicolor: An update. *Cutis* **61**(2):65-68, 71-72, 1998
67. Burkhart CG, Dvorak N, Stockard H: An unusual case of tinea versicolor in an immunosuppressed patient. *Cutis* **27**(1):56-58, 1981
68. Hull CA, Johnson SM: A double-blind comparative study of sodium sulfacetamide lotion 10% versus selenium sulfide lotion 2.5% in the treatment of pityriasis (tinea) versicolor. *Cutis* **73**(6):425-429, 2004
69. Gupta AK, Skinner AR: Ciclopirox for the treatment of superficial fungal infections: A review. *Int J Dermatol* **42**(Suppl 1):3-9, 2003
70. Carrillo-Munoz AJ et al: Sertaconazole: Updated review of a topical antifungal agent. *Expert Rev Anti Infect Ther* **3**(3):333-342, 2005
71. Lange DS et al: Ketoconazole 2% shampoo in the treatment of tinea versicolor: A multicenter, randomized, double-blind, placebo-controlled trial. *J Am Acad Dermatol* **39**(6):944-950, 1998
72. Savin R et al: Tinea versicolor treated with terbinafine 1% solution. *Int J Dermatol* **38**(11):863-865, 1999
73. Drake LA et al: Guidelines of care for superficial mycotic infections of the skin: Pityriasis (tinea) versicolor. Guidelines/Outcomes Committee. American Academy of Dermatology. *J Am Acad Dermatol* **34**(2 Pt 1):287-289, 1996
74. Karakas M, Durdu M, Memisoglu HR: Oral fluconazole in the treatment of tinea versicolor. *J Dermatol* **32**(1):19-21, 2005
75. Fernandez-Nava HD, Laya-Cuadra B, Tianco EA: Comparison of single dose 400 mg versus 10-day 200 mg daily dose ketoconazole in the treatment of tinea versicolor. *Int J Dermatol* **36**(1):64-66, 1997
76. Hickman JG: A double-blind, randomized, placebo-controlled evaluation of short-term treatment with oral itraconazole in patients with tinea versicolor. *J Am Acad Dermatol* **34**(5 Pt 1):785-787, 1996
77. Kose O et al: Comparison of a single 400 mg dose versus a 7-day 200 mg daily dose of itraconazole in the treatment of tinea versicolor. *J Dermatolog Treat* **13**(2):77-79, 2002
78. Partap R et al: Single-dose fluconazole versus itraconazole in pityriasis versicolor. *Dermatology* **208**(1):55-59, 2004
79. Mellen LA et al: Treatment of pityriasis versicolor in the United States. *J Dermatolog Treat* **15**(3):189-192, 2004
80. Faergemann J et al: Efficacy of itraconazole in the prophylactic treatment of pityriasis (tinea) versicolor. *Arch Dermatol* **138**(1):69-73, 2002
81. Bulmer GS, Pu XM, Yi LX: *Malassezia* folliculitis in China. *Mycopathologia* **165**(6):411-412, 2008
82. Akaza N et al: *Malassezia* folliculitis is caused by cutaneous resident *Malassezia* species. *Med Mycol* **47**(6):618-624, 2009
83. Ayers K, Sweeney SM, Wiss K: *Pityrosporum* folliculitis: Diagnosis and management in 6 female adolescents with acne vulgaris. *Arch Pediatr Adolesc Med* **159**(1):64-67, 2005
84. Helm KF, Lookingbill DP: *Pityrosporum* folliculitis and severe pruritus in two patients with Hodgkin's disease. *Arch Dermatol* **129**(3):380-381, 1993
85. Cholongitas E, Pipili C, Ioannidou D: *Malassezia* folliculitis presented as acneiform eruption after cetuximab administration. *J Drugs Dermatol* **8**(3):274-275, 2009

86. Parlak AH, Boran C, Topcuoglu MA: Pityrosporum folliculitis during pregnancy: A possible cause of pruritic folliculitis of pregnancy. *J Am Acad Dermatol* **52**(3 Pt 1):528-529, 2005
87. Faergemann J: Pityrosporum species as a cause of allergy and infection. *Allergy* **54**(5):413-419, 1999