

Granulomatous Skin Infection Caused by *Malassezia pachydermatis* in a Dog Owner

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Background: *Malassezia pachydermatis* is part of the normal cutaneous microflora of dogs and many other mammals. *M pachydermatis* has not yet been reported as an agent that causes skin infection in humans, although it has been found to cause fungemia and other nosocomial infections in preterm newborns and immunocompromised adults.

Observations: *Malassezia pachydermatis* was isolated from the facial granuloma of a healthy woman and her dog's skin scrapings and cerumen. The yeast identity was established by standard methods and scanning electron microscopy. A skin biopsy specimen showed chronic in-

flammatory granuloma, numerous purple-red round or ovoid spores in the superficial necrotic tissue, and sparse red spores in the dermis. The skin lesions healed after oral fluconazole and cryotherapy.

Conclusions: Definite diagnosis of *M pachydermatis*-induced skin infection principally depends on the results of fungal culture and histologic examination, and the combination of oral fluconazole and adjunctive cryotherapy seems to be an effective therapeutic regimen.

Arch Dermatol. 2006;142:1181-1184

THE GENUS *MALASSEZIA*, comprising 10 distinct species, is principally recovered from the skin of mammals and birds but seldom from the environment.^{1,2} *Malassezia pachydermatis*, *Malassezia furfur*, *Malassezia globosa*, and *Malassezia sympodialis* are generally considered to be the main species associated with clinical diseases.¹ *Malassezia pachydermatis*, the only non-lipid-dependent species of the genus *Malassezia*, was first isolated from the scales of an Indian rhinoceros (*Rhinoceros unicornis*) with exfoliative dermatitis by F. D. Weidman in 1925 and named *Pityrosporum pachydermatis*. With the synonymy of *Malassezia* (proposed by H. Baillon in 1889) and *Pityrosporum* (proposed by R. Sabouraud in 1904) being increasingly recognized and accepted in 1984 with anteriority for the generic *Malassezia*, *P pachydermatis* was then adopted as *M pachydermatis*, a name first introduced by C. W. Dodge in 1935 and accepted by M. A. Gordon in 1976.² The importance of *M pachydermatis* has been recognized in both veterinary and human medicine.² Skin colonization by

M pachydermatis is frequent in wild and domestic carnivores, including dogs, cats, bears, ferrets, and foxes; less frequent in rhinoceros, pigs, primates, pinipeds, horses, and birds; and undetected in rodents and lagomorphs.^{1,2} Human skin is commonly colonized by lipid-dependent *Malassezia* yeasts but rarely by *M pachydermatis*.³ *Malassezia pachydermatis* has not yet been reported as an agent that causes skin infection, although it has been found to cause fungemia and other nosocomial infections in preterm newborns and immunocompromised adults.^{2,4-7} We isolated a strain of *M pachydermatis* from an immunocompetent woman with facial granuloma in April 2004. To our knowledge, this is the first report of *M pachydermatis*-induced skin infection in humans.

REPORT OF A CASE

A 46-year-old woman presented with an asymptomatic papule on her face in January 2004. The lesion enlarged gradually and appeared erosive and exudative after self-treatment with topical applica-

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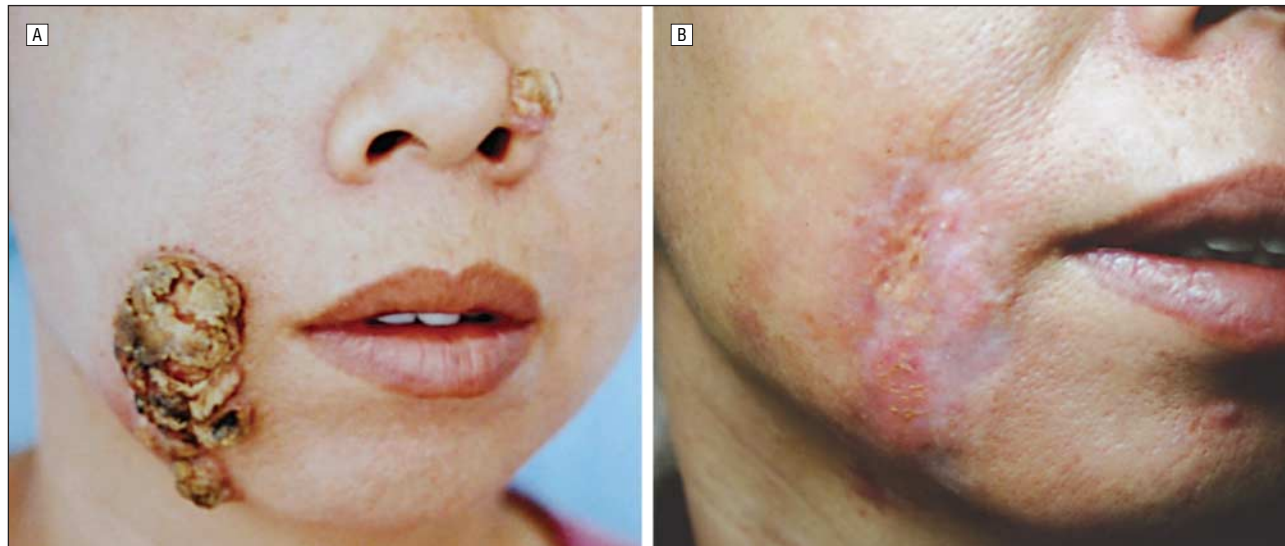


Figure 1. Patient before and after treatment. A, A verrucous plaque on the right side of the face and a hemispheroid nodule on the left ala nasi. B, After treatment, hypopigmented scar on the right side of the face.

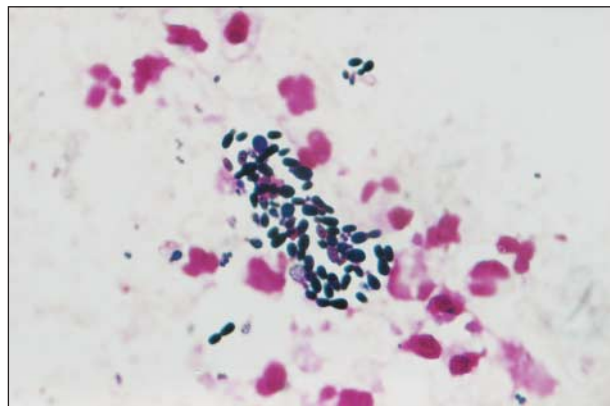


Figure 2. Secretion smear showing numerous gram-positive, yeastlike polymorphous spores (gram stain; original magnification $\times 1000$).

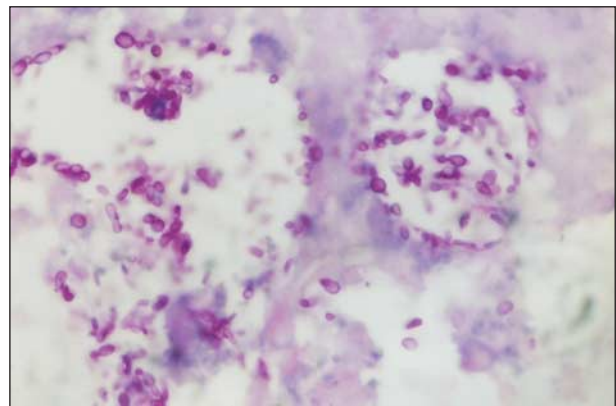


Figure 3. Biopsy specimen showing purple-red round or ovoid spores in the superficial necrotic tissue (periodic acid-Schiff stain; original magnification $\times 1000$).

tion of medicinal herbs. A similar lesion occurred on the left ala nasi 2 months later. She came to the Department of Dermatology at the Affiliated Hospital of Guangdong Medical College in April 2004. She had no history of local trauma and had kept a pet dog for 9 months. At examination, there was a painless verrucous plaque (5.2 \times 3.1 cm) on the right side of her face that was covered with black and greasy crusts and surrounded by 2 nodules, and a yellowish hemispheroid nodule (0.5 cm in diameter) on the left ala nasi (**Figure 1A**). Local lymphadenopathy was absent.

Potassium hydroxide preparation from skin lesions showed no fungal elements, but gram staining revealed numerous gram-positive, yeastlike polymorphous spores (**Figure 2**). A biopsy specimen showed chronic inflammatory granuloma. Epidermal hyperkeratosis, acanthosis, and obvious follicular dilation were apparent, with microabscesses composed of neutrophils in some of the hair follicles. The dermal inflammation was characterized by diffuse infiltration of primarily lymphocytes, plasmacytes, and histiocytes, with occasional eosinophils, neutrophils, and multinucleated giant cells. Periodic acid-Schiff (PAS) staining revealed numerous

purple-red round or ovoid spores in the superficial necrotic tissue and sparse red spores in the dermis (**Figure 3**). The lesional secretions and the dog's skin scrapings and cerumen were cultured using Sabouraud dextrose agar (SDA) at 27°C, and yeastlike milky colonies grew on SDA supplemented with olive oil at 2 weeks and on SDA without lipid supplement at 3 weeks. The colony surface was matte, convex, and wrinkled, and the undersurface was flat. The surface color was ivory at first and darkened from yellow to brown with age. A direct smear showed small and less refractive yeast cells and spores. The fungus grew well on oily SDA at 27°C and 37°C, grew poorly at 41°C, and did not grow at 4°C or 8°C. Catalase test results were negative.

Scanning electron microscopy (Philips XL30; Philips Holland Eindhoven, the Netherlands) revealed that the cells were globose, ovoid, ellipsoidal, or cylindrical in shape and 2.35 to 2.6 $\mu\text{m} \times 2.07$ to 2.1 μm in size. Unipolar blastic development was observed (eg, the daughter cell was separating from the cell wall of the mother cell at one end). The bud body was 1.39 \times 1.37 μm in size, the collarette was 1.3 μm in breadth, and the base

was circular and 0.36 μm thick. The characteristics of these colonies were compatible with those of *M pachydermatis*. Purified tuberculin test results were strongly positive (ie, vesiculation at the inoculation site at 72 hours). Other laboratory investigations did not reveal extracutaneous disease or immunosuppression.

The patient received 4 antituberculars (isoniazid, rifampicin, pyrazinamide, and streptomycin sulfate) for 2 months because the results of direct examination and fungal culture using SDA without lipids were negative and the skin lesions were still augmented. According to positive findings of fungal culture and PAS staining, she was then treated with itraconazole (0.2 g/d), 10% potassium iodide solution (30 mL/d), and ciprofloxacin (0.4 g/d) for 2 weeks. Although the lesions stopped enlarging, the results of direct examination and fungal culture were still positive. Finally, she received fluconazole (0.2 g/d) for 10 weeks, ciprofloxacin (0.4 g/d) for 1 week, and liquid nitrogen cryotherapy 5 times. The skin lesions completely disappeared, leaving hypopigmented scars (Figure 1B). No relapse has occurred at 15 months of follow-up.

COMMENT

Malassezia pachydermatis is part of the normal cutaneous microflora of dogs and many other mammals.¹ *Malassezia pachydermatis* was first believed to be the pathogen of otitis externa in the dog by B. A. Gustafson in 1955 and the cause of canine chronic dermatitis by R. Dufait in 1983.² In view of its importance as a canine pathogen, the carriage of *M pachydermatis* in dogs has been widely surveyed. Low numbers of *M pachydermatis* organisms colonize the stratum corneum in dogs with healthy skin, but their numbers may remarkably increase on the skin and within the ear canals in dogs with allergic skin diseases.¹ However, few studies have examined the prevalence of *M pachydermatis* carriage in humans, although the potential exposure of human beings to the organism is great, especially in those keeping pets.¹ In 200 healthy subjects, 24 (12%) were found to have low numbers of *M pachydermatis* on the scalp and palms according to fungal culture.³ Meanwhile, in another study, *M pachydermatis* was present on the skin of less than 1% of healthy volunteers and approximately 2% of patients with dermatitis who underwent fungal culture.⁸ The positive rates of *M pachydermatis* according to fungal culture and nested polymerase chain reaction were 6% and 92% in skin samples of 50 owners of healthy dogs and 38.7% and 93.3% in 50 owners of atopic dogs, respectively, indicating that the transfer of *M pachydermatis* from the canine skin to the human skin was frequent.¹

Although *M pachydermatis* was isolated from the lacrimal duct in a 61-year-old man with canaliculitis, a skin wound in a 67-year-old man, and the urine in a patient with chronic granulomatous disease, the most reported cases are in preterm infants with intravascular catheter-acquired sepsis.^{2,4,5} In an intensive care nursery, positive culture results for *M pachydermatis* occurred in 15 low-birth-weight infants.⁶ In a report of fungemia in a

neonatal intensive care unit (NICU), *M pachydermatis* infection and colonization appeared in 8 infants with very low birth weights who had various underlying diseases during a 6-month period.⁷ In addition, the source of the outbreak caused by *M pachydermatis* and its prophylactic measures have been investigated. The clinical isolates of *M pachydermatis* in an NICU were nosocomial for all strains isolated, with both patients and incubator surfaces being genetically indistinguishable; regular hygienic measures cannot adequately remove or kill the yeasts, which may persist on glass surfaces for at least 2 months despite regular cleaning of the incubators.⁹ However, *M pachydermatis* was likely introduced into the NICU from health care workers' hands after being colonized from pet dogs at home; careful hand washing by health care workers before and after contact with patients can effectively prevent the introduction and nosocomial transmission of the pet-associated yeast, since all cultures from the nursing staff and attending physicians were negative for the organism after hand-washing practices had been improved.⁶

Lipid supplementation is not an absolute requirement for the growth of *M pachydermatis*, but the addition of lipid material to the culture medium can enhance its growth.^{1,2} It grows at temperatures from 25°C to 41°C and seems to be sensitive to the cold.² *Malassezia pachydermatis* is characterized by cream-colored colonies with dry and smooth surfaces and short ovoid to ellipsoidal cells.² The mode of conidium ontogeny was unipolar budding on a broad base, with a collarette.¹⁰ *Malassezia pachydermatis* is easily identified by the colonies' morphologic and growth features and by microscopic examination, but our patient was initially misdiagnosed owing to the small and less refractive yeast cells on the potassium hydroxide preparation. These yeast cells are found only by careful high-powered microscopy in PAS-stained samples because of limited numbers of small and atypical spores, although a low-powered histologic view is useful to appreciate the pattern of inflammation. Therefore, definite diagnosis of *M pachydermatis*-induced skin infection mainly depends on fungal culture and histologic examination. Of course, the infection source should be carefully traced, and the dog's scurf and cerumen should undergo mycologic examination if possible. We speculate that the strain isolated from the patient could be the same as that from the dog's skin scrapings because of the regular mycologic examination results and the patient's close contact with the dog, although dog-to-patient transmission of *M pachydermatis* is unlikely to be proved by molecular differentiation because the isolate is nonviable.

In vitro susceptibility testing showed that *M pachydermatis* was sensitive to ketoconazole, itraconazole, and voriconazole.¹¹ All isolated strains in an NICU were susceptible to amphotericin B, fluconazole, and itraconazole but resistant against flucytosine.⁷ Both pulse administration and once-daily administration of itraconazole were found to have similar effects in the treatment of canine cutaneous infection caused by *M pachydermatis*.¹² Our patient achieved good results with combined treatment with oral fluconazole and

cryosurgery, indicating that the combination of oral fluconazole and adjunctive cryotherapy is effective in the treatment of skin infection due to *M pachydermatis* and that the effectiveness of cryotherapy may be related to the vegetative character of the yeast (eg, no growth at 8°C or less).

Accepted for Publication: March 14, 2006.

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Financial Disclosure: None.

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ARCHIVES Web Quiz Winner

Congratulations to the winner of our June quiz, Marc A. Stees, MD, Dixon, Ill (private practice). The correct answer to our June challenge was *protothecosis*. For a complete discussion of this case, see the Off-Center Fold section in the July ARCHIVES (Pimentel CL, Alegre M, Dalmau J, et al. Erythematous papules on the leg. *Arch Dermatol.* 2006;142:921).

In addition, it was announced in error in the August issue that Dr Stees was the winner of the May quiz. The correct name of the winner of the May quiz is Mahmoud Saeed Khalil Abou-Hamidah, MD, a dermatology and venereal disease specialist at Shaqra Hospital, Shaqra, Kingdom of Saudi Arabia. Congratulations to Dr Abou-Hamidah for winning the May quiz.

Be sure to visit the *Archives of Dermatology* Web site (<http://www.archdermatol.com>) to try your hand at the interactive quiz. We invite visitors to make a diagnosis based on selected information from a case report or other feature scheduled to be published in the following month's print edition of the ARCHIVES. The first visitor to e-mail our Web editors with the correct answer will be recognized in the print journal and on our Web site and will also receive a free copy of *The Art of JAMA II*.