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Letter

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Mural Folliculitis and Alopecia with Cutaneous Candidiasis in a Beagle Dog

Hyun-A Lee[1,2], Sunhwa Hong[1,2], Ohmok Choe[1] and Okjin Kim[1,3]*

[1]*Center for Animal Resources Development, Wonkwang University, Iksan, Republic of Korea*
[2]*Institute of Animal Experiment & Efficacy Evaluation, Wonkwang University, Iksan, Republic of Korea*
[3]*Institute of Biotechnology, Wonkwang University, Iksan, Republic of Korea*

A one-year-old male Beagle dog showed dermatitis, alopecia and scales. Examination of the affected dog revealed generalized alopecia, patchy erythema, and superficial erosions with histological evidence of mural folliculitis. External tests for parasites in scraped skin samples were negative. However, fungal culture tests and polymerase chain reaction revealed the existence of *Candida* in the lesion. These results suggest that cutaneous candidiasis may induce mural folliculitis and alopecia in dogs.

Keywords: Candidiasis, mural folliculitis, alopecia, dog

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Nearly all diseases of the skin have the potential to cause alopecia. Also, it is important to remember that it is normal to lose hair. Hair follicles are continually losing and developing new hairs. Alopecia can be separated into pruritic (itchy skin diseases) and non-pruritic (Moretti *et al*, 2004). Non-pruritic alopecia may be induced by hypothyroidism, hyperadrenocorticalism, and hormonal unbalance. On the other hand, the causes of pruritic alopecia include fleas, scabies, allergy, bacteria-induced pyoderma and fungus (Cerundolo *et al*, 2000). Adult-onset, nonpruritic, symmetrical or generalized hair loss in dogs is commonly caused by endocrine disorders such as hypercorticoidism, hypothyroidism, and hyperestrogenism due to a testicular Sertoli cell tumor. In some breeds such as Nordic breeds, miniature poodles, and water spaniel dogs, there is an adult-onset form of hair loss for which the pathogenesis is still not completely clear (Cerundolo *et al*, 2000). Canine dermal mycotic infections include dermatophytosis, *Malssezia* dermatitis, and candidiasis (Scott *et al*, 2001). Cutaneous candidiasis is an uncommon disease in dogs and *Candida albicans* is recognized as the aetiological agent (Guillot *et al*, 1996; Carlotti, 1997). Here, we describe the cutaneous candidiasis with mural folliculitis and alopecia in Beagle dog.

A one-year-old male Beagle dog was obtained from the Animal Facilities of the Center for Animal Resources Development, Wonkwang University, Korea. Over the previous 2 months, the dog had shown dermatitis, alopecia and scales. The lesions occurred sporadically on general area. The dog was given a health examination. Tests for external parasites in skin sample scrapings were conducted. The biopsied tissues was fixed in 10% neutral buffered formalin, and embedded in paraffin. Four μm sections were made and stained with hematoxylin and eosin for histopathological examination. Fungal culture tests and polymerase-chain reaction (PCR) were done as previously described (Moretti *et al*, 2004). The primers used in this study were: Forward (5′-ATGACTGATCAAGAAATYGCTAA-3′) and Reverse (5′-TAACCTGGAGAAACYAAAAC-3′). The PCR was carried out in 100 mL of a reaction mixture containing final concentrations of 60 mM Tris-HCl (pH 8.5), 15 mM $(NH_4)_2SO_4$, 2.5 mM $MgCl_2$, 0.2 mM dNTPs, 2.5 U AmpliTaq DNA polymerase (Roche, Indianapolis, IN, USA), 0.3 mM primer B1, and 0.3 mM primer F1. Conditions of amplification were as follows: first, 15 min at 94°C, then 40 cycles of three steps (3 min at 94°C, 1 min at 49°C, and 90 sec at 72°C). The last cycle was followed by a 10 min extension at 72°C. After amplification, gel electrophoresis of amplicons was conducted.

*Corresponding author: Okjin Kim, Center for Animal Resources Development, Wonkwang University, 344-2 Shinyoung-dong, Iksan, Jeonbuk 570-749, Republic of Korea
Tel: +82-63-850-6668
Fax: +82-63-850-7308
E-mail: kimoj@wku.ac.kr

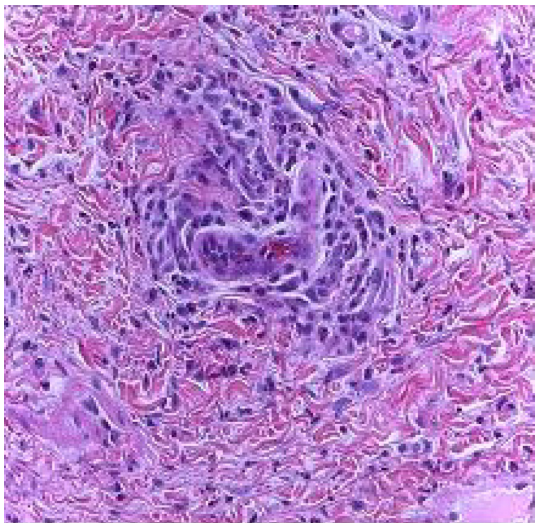

Figure 1. Histopathological findings of a section of the skin from a dog with alopecia secondary to infection with *Candida*. Hematoxylin-eosin stain. ×200

Examination of the affected dog revealed generalized alopecia, patchy erythema, and superficial erosions. The results of physical examination and hematology revealed normal values. The histological examination of cutaneous biopsies showed signs of orthokeratotic hyperkeratosis, moderate follicular keratosis and light epidermic acanthosis. In bioptic sections, the fungi looked like round basophilic cells or as pseudohyphae. They infiltrated superficial and deep layers of the epidermis and the internal portion of isthmus-infundibular structures of the hair follicle, with histological evidence of mural folliculitis (Figure 1). Tests for external parasites in scraped skin samples were negative. However, fungal culture tests and the PCR revealed the existence of *Candida* in the lesion (Figure 2).

Yeasts of the genus *Candida* are components of the microbiota of healthy beings and are described as causes of opportunistic mycoses around the world. These yeasts are widely distributed in the environment and frequently colonized in skin and mucous membranes (such as the oral cavity) and genital and gastrointestinal tracts of mammalians (Fotos and Hellstein, 1992). In dogs, yeasts belonging to *Candida* genus prefer constantly humid areas, which favor tissue maceration, as occurs in mucous membranes, mucocutaneous junctions, intertriginous areas, nail substructure inter-fingers areas, ear canals and the lateral face of the ear and genital tract membrane (Fotos and Hellstein, 1992; Cleff *et al*, 2005). Physiologic changes like the estrous cycle and pregnancy are also considered predisposing factors for Candida spp proliferation (Fahey and Wira, 2002). *Candida albicans* is not a member of the normal skin flora and its presence is always

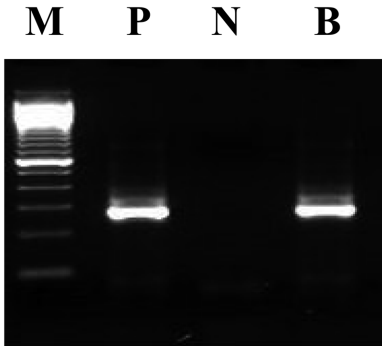

Figure 2. Gel electrophoresis of DNA amplicons by *Canidida*-specific PCR. M, 100-bp DNA ladder; P, positive control; N, negative control; B, biopsied skin DNA.

the expression of a pathologic state and of its intrinsic pathogenicity. Our study was done to describe an interesting clinical case of mural folliculitis and alopecia due to *Candida albicans* in dog. It was identified by means of culture assays, histopathological examination, and by molecular biological techniques such as PCR. As a molecular method, PCR offers many application possibilities and it is significantly more sensitive than conventional tests.

In conclusion, these results suggest that cutaneous candidiasis may induce mural folliculitis and alopecia in dog. On the basis of our knowledge, this is the first report of mural folliculitis and alopecia caused by *Candida* infection in a dog.

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