Short communication

Treatment of *Microsporum canis* Infection in a Cat Using a Fungal Vaccine

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Abstract

Successful treatment of *Microsporum canis* infection in a 8 - year – old, male Thai - mixed breed cat using a fungal vaccine containing inactivated *M. canis* by 3 subcutaneously injection 14 days apart was reported. A reduction of the lesions and hair regrowth had improved by day 14 after the first injection. There were no adverse effects in the cat during the entire treatment. The results of this study indicate that an inactivated *M. canis* vaccine may be effective therapy for *M. canis* infection.

Keywords: cat, fungal vaccine, *Microsporum canis*

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Introduction

Dermatophytosis (ringworm) is a common infection in both small and large animal practice. It is typically caused by *Microsporum canis, M. gypseum* and *Trichophyton mentagrophytes*. *M. canis* infection is the most common in dogs and cats, which can transmit the pathogen to humans (Segal and Elad, 2006). The typical presentation of ringworm is regular and circular alopecia with hair breakage, desquamation and sometimes an erythematous margin and central healing. Lesions may be single or multiple, and are localized mostly on the head but also on any part of the body. Pruritus is variable, generally mild to moderate, and usually no fever or loss of appetite is observed (Moriello and DeBoer, 2012). Diagnosis of dermatophytosis is made easily on the basis of dermatological samples and culture (Moriello, 2004).

For the treatment of dermatophytosis, a number of oral and topical antifungal drugs have been used successfully. Griseofulvin, ketoconazole, itraconazole, fluconazole and terbinafine are the antifungal drugs most commonly used in veterinary medicine (Boothe, 2012). However, there is a limitation on using oral antifungal drugs in some cases such as animals who vomit after taking oral drug, animals with liver diseases and animals who develop adverse effects or resistance to the drugs. Instead of using antifungal drugs, a number of fungal vaccines have been developed for prevention and treatment of dermatophytosis in horses, cattle, dog and cat (DeBoer and Moriello, 1995; Blanco and Garcia, 2008). Veterinary vaccines effective against fungal infection have been marketed in different countries for many years (Blanco and Garcia, 2008).

Because of the zoonotic characteristic of dermatophytosis and the consequent need for costly long - term treatment, prophylactic prevention using vaccines has started to play a greater role. In addition, some vaccines are being used as therapeutic agents.

Recently, there is a commercial fungal vaccine recommended for treatment of *M. canis* infection in dog and cat in Thailand. It is a fungal vaccine consisting of immunogenic inactivated strain of *M. canis* vegetative forms. This vaccine has been reported as successful in immunization of cats against *M. canis* (Rybnikar et al., 1997).

This report reveals the successful treatment of *M. canis* infection in a cat using a fungal vaccine consisting of immunogenic inactivated strain of *M. canis* vegetative forms.

Case History and Clinical Examination

A 8 – year - old, 4 kg neutered male Thai – mixed breed cat with history of repeated *M. canis* infection was presented in Suvarnachad animal hospital, Bangkok, Thailand. The cat had been treated in other animal hospital with oral itraconazole 10 mg/kg PO every 24 h for a month but the clinical signs recurred every time after the therapy had stopped for 3 – 4 months.

On physical examination, circular alopecia with crusts and hyperpigmentation were observed at the shoulder (Fig 1a).

Hair and scale from the margins of lesions were collected for fungal culture in dermatophyte test media containing Sabouraud's dextrose agar (Megacor^{R}, Austria) and incubated for 14 days at 25 ^{o}C. Fungal culture revealed a white cottony – to woolly – appearing colony which indicates the morphology of *M. canis* colony (Miller et al., 2013). Multiple skin scrapings were also taken and examined microscopically in paraffin oil, while other portions were stained with Gram's staining. Microscopic examination revealed the presence of a few cocci bacteria. Hematology and blood chemistries were in normal range in the cat on day 0 of the treatment.

Treatment and Discussion

The cat was treated with an immunogenic inactivated strain of *M. canis* CCM 8211 vaccine (Biocan^{R} M Derm, Bioveta, a.s., Czech Republic) by subcutaneously injection on day 0, 14 and 28 of the treatment. Skin scrapings and the general health of the cat were monitored at intervals of 14 days for 2 months. No any other drugs was prescribed to the cat.

A typical treatment outcome was observed on day 14 of the treatment (Fig 1b). The skin lesions had decreased in size, but the alopecia areas remained the same. After the second injection, the alopecia areas became smaller and hair regrowth was seen. The resolution of the condition was completed on day 56 of the treatment (Fig 1c). The fungal cultures were negative on day 28 of the treatment. No recurrent symptoms were observed during the 8 - month follow up period after the clinical cure.

Although dermatophyte infection is confined to the superficial keratinized tissues, it induced a humoral and a cellular immune response (DeBoer et al., 1991; DeBoer and Moriello, 1993). The cellular wall of dermatophytes is composed mainly of chitin, glucans and glycopeptides, which are the main antigens of these fungi (Wagner and Sohnle, 1995). The most important antigens are the proteic portion of glycopeptides that stimulate the humoral immune response , and keratinases, which produce a delayed hypersensitivity response when they are inoculated intradermally (Dahl, 1993). In the past, many European countries undertook very successful vaccination programs to eradicated cattle dermatophytosis caused by *Trichophyton verrucosum*. Vaccination against *Trichophyton* infection in horses and fur – bearing animals has also been spectacularly successful in many countries (Lund and DebBoer, 2008). *M. canis* vaccination was explored by Elad and Segal (1994) who used experiments in guinea pigs with an *M. canis* ribosomal fraction. Moreover, a commercial vaccine consisting of killed *M. canis* components in adjuvant was licensed in the USA for treatment of cats rather than prevention (Frymus et al., 2013). However, this vaccine did not prevent the infection and also did not provide a more rapid cure (DeBoer et al., 2002). An immunogenic inactivated *M. canis* vaccine was introduced into veterinary practice in 1996. The results evaluated so far by veterinarians and cat fanciers have been positive (Rybnikar et al., 1997).

In this study, a fungal vaccine consisting of immunogenic inactivated strain of

M. canis vegetative forms was used for the treatment of *M. canis* infection in a cat. As a result, a reduction of the lesions and hair regrowth in the cat had improved by more than 80% by day 7 after the second injection. There were no adverse effects in the cat during the entire treatment. The results of the present study indicate that an inactivated *M. canis* vaccine may be a safe and effective therapy for *M. canis* infection. Further study should be evaluated a prophylactic efficacy of the vaccine against *M. canis* infection.

Figure 1 Macroscopic lesions (circular alopecia with crusts) at dorsal area of the shoulder. a: before treatment; b: on day 14 of the treatment; c: on day 56 of the treatment.

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บทคัดย่อ

การรักษาการติดเชื้อไมโครสปอรุ่ม เคนิสในแมวโดยใช้วัคซีนเชื้อรา

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รายงานความสำเร็จในการรักษาโรคติดเชื้อราไมโครสปอรุ่ม เคนิสในแมวพันธุ์ไทยผสม เพศผู้ อายุ 8 ปีด้วยการใช้วัคซีนเชื้อราที่ประกอบด้วยไมโครสปอรุ่ม เคนิสโดยการฉีดเข้าใต้ผิวหนังสัปดาห์ละครั้งทุก 14 วันรวม 3 ครั้งพบว่ารอยโรคลดลงและขนเริ่มงอกขึ้นใหม่ภายใน 14 วันหลังจากการฉีดวัคซีนเชื้อราครั้งแรก นอกจากนี้ไม่พบผลไม่พึงประสงค์จากวัคซีนเชื้อราในแมวที่ได้รับวัคซีนเชื้อราตลอดช่วงการรักษา ผลการรักษาแสดงให้เห็นว่าวัคซีนเชื้อราอาจเป็นวิธีการรักษาที่มีประสิทธิผลต่อการรักษาโรคเชื้อราที่มีสาเหตุจากไมโครสปอรุ่ม เคนิส

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