Short Communications

**Attempted isolation of *Blastomyces dermatitidis* from the nares of dogs: Northern Wisconsin, USA**

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The nasal cavities of domestic animals may concentrate and allow isolation of environmentally acquired fungal pathogens. We obtained two swabs each from the nares of 110 asymptomatic, physically normal dogs from a veterinary practice in Eagle River, WI, USA, an area highly endemic for blastomycosis. Four of the tested dogs had past histories of blastomycosis. Samples were placed on yeast extract phosphate (Smith’s) media at 20°C but growth of *Blastomyces dermatitidis* was not observed on any of the 220 cultures. One dog developed cytologically confirmed *B. dermatitidis* one month following culture of its samples, 6 died of other illnesses, while 91/103 dogs completing follow-up have remained asymptomatic for three years. We did not observe nasal colonization by *B. dermatitidis* in this population of dogs with potential for sniffing and digging in an environment highly endemic for this fungus.

**Keywords** Blastomyces, blastomycosis, dog, mycoses, subclinical

Introduction

Several reports have documented the isolation of *Sporothrix schenckii* [1–3] and *Cryptococcus* species [4–7] from the nasal cavities of dogs, cats and koalas. It has been suggested that the nasal cavities of such animals act as ‘natural air filters that concentrate organisms from the surrounding environment’ [4]. The nasal cavities of dogs may be particular harbingers of environmentally acquired pathogenic fungi given their propensity to dig and sniff.

To our knowledge, attempted isolation of the dimorphic fungus, *Blastomyces dermatitidis*, from the nasal passages of asymptomatic dogs has not been reported and little is known about the rate of asymptomatic clinically demonstrable blastomycosis in these animals. Surveys have revealed the presence of the fungus at tissue necropsy in 1–2% of dogs in endemic areas [8]. Demonstration of such asymptomatic nasal carriage could have implications regarding the natural history of blastomycosis or development of immunity to *B. dermatitidis*, or allow further elucidation of microfoci of very high endemicity [9], by utilizing nasally colonized dogs as sentinel animals. The purpose of this study was to investigate whether dogs living in a very highly endemic area (Northern Wisconsin) might carry *B. dermatitidis* in their nares.

**Materials and methods**

This study was approved by the Aurora Health Care animal research committee.

A convenience sample of 110 sedated and non-sedated domestic dogs presenting for routine visits or elective procedures at the Eagle River Animal Hospital, Eagle River, WI, USA from June–July 2004 was utilized for collection of nasal cultures. The epidemiology and geographic distribution of dogs in this practice located in an area highly endemic for blastomycosis has been previously reported [10]. All dogs were free of clinical signs of blastomycosis at the time of specimen collection. However
four dogs had been previously diagnosed with blastomycosis, confirmed by cytology and typical radiographic features, and had ended treatment between August 2003 and June 2004. Sample size was calculated for 95% confidence to identify one positive dog if the carriage rate was 5% in this veterinary population (a proposed minimum rate for a useful sentinel animal).

A separate BBL CultureSwab (BD Biosciences, Cockysville, MD, USA) was rotated in each nostril as described by Duncan et al. [7], kept refrigerated, then placed within one week on yeast extract phosphate (Smith’s) medium with one or two drops of concentrated NH4OH. Cultures were examined biweekly for 10 weeks. This methodology was previously used to isolate B. dermatitidis from the stool of a dog [11]. The culture swabs have been shown to keep spiked samples of B. dermatitidis viable, refrigerated or at room temperature, for at least 20 days [D. J. Baumgardner, observations preparatory to reference 11], and similar swabs were used to isolate Cryptococcus from dog nasal passages [7].

Results

None of the nasal cultures from the 110 asymptomatic dogs (220 total samples) yielded detectable growth of B. dermatitidis.

One tested dog developed typical symptoms of pulmonary blastomycosis and had B. dermatitidis identified by sputum cytology and agarose gel immunodiffusion (AGID) one month following sampling. Six dogs died of other causes and 12 dogs were lost to follow-up, the remaining 91 dogs remained asymptomatic over three years of follow-up.

Discussion

Sporothrix infection or colonization of the nose of animals presumably occurs by traumatic inoculation of conidia from plants and other natural material [3]. Cryptococcus infection in animals is thought to follow inhalation of the organisms and subsequent colonization of the nasal cavity and sinuses [7]. Blastomycosis in animals generally results from inhalation of conidia of B. dermatitidis from the environment into the lungs where transformation to the yeast form occurs [8].

Presumably, successful colonization by B. dermatitidis of the nasal cavity in the dog, if it were to occur, might result in transformation to yeast forms too large to reach lung tissue. However at 25°C the external naris of the dog averages 33.5°C, 4.5° lower than the internal naris [12], and expiratory nasal air temperatures range from 29–32° at room temperature [13]. Consequently, the distal naris could potentially harbor mold forms of the fungus. Infection of nasal mucosa by B. dermatitidis has only rarely been reported (in humans) [14,15]. Thus, nasal colonization followed by pulmonary or systemic infection by this fungus may not be expected to occur as readily as in the case of Cryptococcus in dogs [6,7]. Nonetheless, B. dermatitidis could conceivably establish local asymptomatic colonization in the nasal mucosa of dogs, or at least be transiently present following digging or sniffing in an environmental focus of high conidia density.

This study failed to demonstrate asymptomatic nasal carriage of B. dermatitidis in a moderate sized sample of dogs from a highly endemic area. Negative dogs included four dogs with prior blastomycosis, and, significantly, one dog that suffered pulmonary B. dermatitidis infection within one month. Such carriage may indeed happen very rarely, if at all, or the culture technique may have been insensitive. Recently, Kovarik et al. documented a 2.4% Sporothrix schenckii nasal carriage rate in asymptomatic cats in an endemic area of Peru [3]. If a similar rate of B. dermatitidis nasal carriage in asymptomatic dogs was assumed, this study would have had approximately 75% confidence of finding one dog with a positive nasal culture in this population of dogs, assuming similar test sensitivities.

Further definition of the ecological niche of this organism may perhaps best be undertaken by use of polymerase chain reaction-based detection of DNA of this fungus in environmental samples [16] or in other indicator animals [17] (yet undefined for B. dermatitidis [18]).

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References


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