

# Update on Fungal Respiratory Disease in Horses

Allison J. Stewart, BVSc, MS\*, Rosemary S. Cuming, BVSc, MANZCVS

## KEYWORDS

- Fungus • Horse • Pneumonia • Aspergillosis • Cryptococcosis
- Conidiobolomycosis • Coccidioides • Blastomycosis

## KEY POINTS

- Fungal respiratory disease is rare in horses, although more common in certain geographic locations.
- Several fungal organisms are capable of causing respiratory disease in horses. Some are primary pathogens and others cause disease only in immunocompromised hosts.
- Treatment consists of various combinations of surgical debridement, topical and systemic antifungal medications, and supportive care.
- Prognosis is variable and may be influenced by lesion location, fungal organisms involved, treatment options available, and owner finances.

## INTRODUCTION

Fungal respiratory disease is a rare, yet potentially life-threatening, occurrence in horses. Fungal infections have been reported to occur at all levels of the respiratory tract in horses but are most commonly observed in the paranasal sinuses, guttural pouches, and lungs. Diagnosis and treatment of fungal respiratory infections pose a challenge for the equine practitioner, and the prognosis for complete resolution of infection is often guarded. This article outlines the causes, clinical signs, diagnostic tests, and treatment options currently available for equine fungal respiratory disease.

## ETIOLOGY

Fungi are eukaryotic organisms with a definitive cell wall made up of chitins, glucans, and mannans. Within the fungal cell wall, the plasma membrane contains ergosterol, a

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J.T. Vaughan Large Animal Teaching Hospital, Department of Clinical Sciences, Auburn University College of Veterinary Medicine, 1500 Wire Road, Auburn, AL 36849, USA

\* Corresponding author.

E-mail address: [Stewaaj@gmail.com](mailto:Stewaaj@gmail.com)

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**Table 1**  
Fungal pathogens of the equine respiratory tract

Primary Pathogenic Fungi	Opportunistic Pathogenic Fungi
<i>Blastomyces dermatitidis</i>	<i>Aspergillus</i> spp
<i>Histoplasma capsulatum</i>	<i>Candida</i> spp
<i>Coccidioides immitis</i>	<i>Fusarium</i> spp
<i>Cryptococcus neoformans</i>	<i>Emmonsia crescens</i>
<i>Conidiobolus coronatus</i>	<i>Pneumocystis carinii</i>

compound frequently targeted by antifungal agents. There are more than 70,000 species of fungi, but only 50 species are known to cause disease in mammals. Pathogenic fungi are divided into 3 groups: multinucleate septate filamentous fungi, nonseptate filamentous fungi, and yeasts. Dimorphic fungi are able to interchange between forms depending on environmental conditions, eg, *Blastomyces dermatitidis*, *Histoplasma capsulatum*, and *Coccidioides immitis* exist in yeast form in vertebrate host tissue and in hyphal/mycelial form in vitro.

Fungi are ubiquitous in the equine environment (eg, in hay, soil, and bedding), and fungal infections have been reported in horses of all ages, breeds, and occupations. Fungal respiratory disease is considered rare in horses; however, geographic variability in frequency does exist. Pathogenic fungi can be primary pathogens, capable of infecting immunologically normal horses, or opportunistic pathogens, which are capable of infecting only horses that are immunocompromised, such as those undergoing treatment with corticosteroids or with a concurrent, unrelated disease, eg, colitis or neoplasia (Table 1). In most cases of upper respiratory tract fungal disease predisposing causes are not identified. By contrast, fungal pneumonia usually occurs in immunocompromised horses, although on occasion, the normal individual may be affected. Important predisposing factors for fungal pneumonia include qualitative and quantitative granulocyte abnormalities and the presence of devitalized tissue.

Respiratory fungal disease is most frequently acquired via inhalation of the causative organism; however, some cases of fungal pneumonia are thought to arise by penetration of fungi through a compromised gastrointestinal tract or open wound. After inhalation, the causative organisms are able to penetrate into the distal airways and alveoli because of their small sporular diameter. More than 90% of particles in stable air visible under a light microscope are spores of fungi or actinomycetes,<sup>1</sup> and one study showed that the concentration of respirable dust increases 6-fold during normal stable bedding down procedures.<sup>2</sup>

### **Cryptococcosis**

Cryptococcosis is caused by *Cryptococcus neoformans* (var *neoformans* and var *gattii*). There is an epidemiologic relationship between *C neoformans* var *gattii* and the Australian river redgum tree (*Eucalyptus camaldulensis*), and *C neoformans* var *neoformans* has historically been associated with bird (particularly pigeon) excreta.<sup>3</sup> *Cryptococcus* is a ubiquitous, saprophytic, round, basidiomycetous, yeastlike fungus with a large heteropolysaccharide capsule. The capsule is both immunosuppressive and antiphagocytic and forms a clear halo when stained with India ink. This characteristic morphology allows for reliable diagnosis of cryptococcosis via cytology or histology (Fig. 1).<sup>4</sup> Serologic testing with latex agglutination to identify cryptococcal capsular antigen is also useful, with resolution of lesions correlated with declining serum titers.<sup>5,6</sup>

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