



# Disease Caused by *Aspergillus*, a Type of Fungus (Aspergillosis)

## Basics

### OVERVIEW

- *Aspergillus* species are common molds (type of fungus) that are found throughout the environment; they form numerous spores in dust, straw, grass clippings, and hay
- “Aspergillosis” is an opportunistic fungal infection caused by a species of *Aspergillus*; “opportunistic infections” are infections caused by an organism that usually does not cause disease but is able to cause disease because the pet's body and/or immune system has been weakened by some other disease process
- Two types of *Aspergillus* infections—(1) nasal disease, in which the infection is localized to the nasal passages and frontal sinuses, and (2) widespread disease (known as “disseminated disease”); the two types do not appear to be related, but a report of a dog that developed fungal infection/inflammation of the bone marrow and bone (known as “osteomyelitis”) 6 months after treatment of the nasal type of aspergillosis raises the possibility that they may be related, at least in some pets
- Nasal disease—*Aspergillus fumigatus* most frequently involved; *A. flavus*, *A. niger*, and *A. nidulans* also isolated; presumed infection through direct introduction of the fungus into the moist lining of the nose and/or sinuses
- Widespread (disseminated) disease—usually *Aspergillus terreus*; *A. deflexus* and *A. fumigatus* also identified; portal of entry into the body not established definitively, but possibly through the respiratory tract or gastrointestinal tract, with subsequent spread through the bloodstream

### SIGNALMENT/DESCRIPTION OF PET

#### Species

- Dogs
- Cats
- Both types (nasal disease and widespread [disseminated] disease)—more common in dogs than in cats

#### Breed Predispositions

- Nasal disease—more common in young adult dogs with a long head and nose (known as “dolichocephalic dogs,” such as the collie and Afghan hound) and dogs with a medium-length head and nose (known as “mesocephalic dogs,” such as the pointer, Labrador retriever, and beagle)
- Widespread (disseminated) disease—more common in German shepherd dogs, but not confined to this breed
- Persians—marginally increased likelihood than in other cat breeds

#### Mean Age and Range

- Nasal disease in dogs—age range, 3 months–11 years

- Widespread (disseminated) disease in dogs—reported average age of affected dogs, 3 years; range of 1–9 years of age

### **Predominant Sex**

- Widespread (disseminated) disease in dogs—slight bias toward females being infected over males

## **SIGNS/OBSERVED CHANGES IN THE PET**

### **Dogs**

#### ***Nasal Disease***

- Long-term (chronic) nasal discharge from one or both nostrils; discharge may be clear or may contain mucus, pus, and/or blood; commonly have a large volume of nasal discharge with blood and pus in it that is not responsive to treatment with antibiotics—most common sign
- Sneezing
- Nasal pain
- Bleeding from the nose and nasal passages (known as “epistaxis” or a “nosebleed”)
- Reduced appetite; sluggishness (lethargy)
- Loss of pigment (known as “depigmentation”) or loss of tissue on the surface of the skin, frequently with inflammation (known as “ulceration”) around the nostrils
- Visible distortion or swelling of the nose—uncommon
- Signs of central nervous system involvement, if the infection has moved from the nasal passages into the brain

#### ***Widespread (Disseminated) Disease***

- May develop suddenly (acutely) or slowly over a period of several months
- Often associated with spinal pain due to fungal infection of the intervertebral disks and adjacent bone of the spine (vertebral bodies; condition known as “fungal diskospondylitis”) or lameness due to fungal infection/inflammation of the bone marrow and bone (osteomyelitis)
- Nervous system disease—spinal cord damage
- Kidney disease—increased urination (known as “polyuria”), increased thirst (known as “polydipsia”) and blood in the urine (known as “hematuria”)
- Eye disease—inflammation of the iris and other areas in the front part of the eye (known as “uveitis”); the “iris” is the colored or pigmented part of the eye
- Nonspecific signs—fever, weight loss, vomiting, enlarged lymph nodes (known as “lymphadenopathy”), and lack of appetite (known as “anorexia”)

### **Cats**

#### ***Nasal Disease***

- Nasal discharge and noisy breathing (low-pitched, snoring sound) when inhaling (known as “stertor”)
- Frontal sinus involvement reported (with or without involvement of the bones around the eyes)

#### ***Widespread (Disseminated) Disease***

- Most commonly associated with nonspecific signs (such as sluggishness [lethargy] and depression or vomiting and diarrhea)
- Eye disease—protrusion of the eyeballs (known as “exophthalmos”)
- Usually affect the lungs, gastrointestinal tract, or both

## **CAUSES**

- *Aspergillus* species

## **RISK FACTORS**

- Nasal disease—more common in outdoor dogs and farm dogs; young adult dogs with a long head and nose (dolichocephalic dogs, such as the collie and Afghan hound) and dogs with a medium-length head and nose (mesaticephalic dogs, such as the pointer, Labrador retriever, and beagle)
- Widespread (disseminated) disease—German shepherd dogs most commonly affected
- Inability to produce a normal immune response (known as “immunodeficiency”)—may play a factor because *Aspergillus* species are found throughout the environment, but disease is uncommon; breed-related immune defect proposed in German shepherd dogs and their crosses
- Geographic/environmental conditions—may be a factor because some regions (such as California, Louisiana,

Michigan, Georgia, Florida, and Virginia in the United States; Western Australia; Barcelona; and Milan) have a higher incidence of *Aspergillus* infection than other regions

- Cats—associated with feline infectious peritonitis (FIP), feline panleukopenia virus, feline leukemia virus (FeLV), diabetes mellitus (“sugar diabetes”), and long-term (chronic) steroid or antibiotic administration

## Treatment

### HEALTH CARE

#### Nasal Disease in Dogs

- Medications to kill the fungus administered by mouth or injection (known as “systemic antifungal therapy”)—limited success
- If the cribriform plate (the narrow bony structure between the nasal passages and the brain) is affected, avoid medication applied directly into the nose (known as “topical therapy”) and administer medication by mouth (known as “oral therapy”), such as itraconazole
- Clotrimazole (1%) is an antifungal drug administered directly into the nose and nasal passages, while the dog is under general anesthesia—treatment of choice; carefully monitor recovery from anesthesia following treatment with clotrimazole—some dogs may develop fluid buildup in the voice box or larynx (known as “laryngeal edema”) or in the throat (known as “pharyngeal edema”) due to irritation from the solution; more than one treatment may be required (3–4 treatments in some cases)
- Enilconazole is another antifungal drug that can be used instead of clotrimazole

#### Widespread (Disseminated) Disease in Dogs

- Difficult to eliminate infection; rare cures have been reported
- Halt progression of clinical signs, rather than eliminate infection
- Itraconazole is an antifungal drug—most effective treatment
- Combination of flucytosine and injectable amphotericin B in 4.5% saline and 2.5% dextrose—used to treat disseminated cryptococcosis (another fungal disease) successfully; may prove to have some use in treating aspergillosis (no published reports)
- Fluid therapy—indicated by the degree of kidney disease and excess levels of urea and other nitrogenous waste products in the blood (known as “uremia” or “azotemia”)

#### Cats

- Nasal disease—report of successful treatment of one cat with administration of clotrimazole (an antifungal drug) directly into the nose and nasal passages, while the cat is under general anesthesia, following treatment failure with itraconazole
- Widespread (disseminated) disease—likely difficult to treat

## Medications

- Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive

### NASAL DISEASE

- 1% clotrimazole (polyethylene glycol base preferred)—administered directly into the nasal passages (topical treatment) for 1 hour is the treatment of choice, if the cribriform plate (the narrow bony structure between the nasal passages and the brain) is intact; 90% success rate; may require more than one treatment
- Enilconazole 1% or 2% emulsion administered directly into the nasal passages for 1 hour; 80–90% success rate; may require more than one treatment
- Enilconazole—10% emulsion diluted 50:50 with water immediately before administration; administered directly into the nasal sinuses via surgically implanted frontal sinus catheters for 7–14 days (not appropriate as a 1-hour therapy)
- Antifungal medications administered by mouth—ketoconazole or fluconazole: much lower rates (43–60%) of cure than with topical treatment; itraconazole: 60–70% response rate reported, but cost is a factor

### WIDESPREAD (DISSEMINATED) DISEASE

- Itraconazole—antifungal drug of choice; dogs unlikely to be cured, though the disease may be contained with

continued use

- Combination therapy with flucytosine and amphotericin B—may prove successful
- New triazoles, voriconazole and posaconazole, are potential alternative medications for pets that respond poorly to itraconazole

## Follow-Up Care

### PATIENT MONITORING

- Nasal disease—nasal discharge should be well reduced 2 weeks after treatment and eliminated by 4 weeks; if still significant discharge after 2 weeks, consider a treatment failure and retreat; consider antibiotics because bacterial infection can be a problem owing to damage sustained to lining of the nose and to the turbinates (the curved bones in the nasal passages) by the *Aspergillus* infection; recurrence of discharge after initial resolution is rarely due to recurrence of fungal infection, consider bacterial infection
- Widespread (disseminated) disease—monitor serial x-rays (radiographs) every 1–2 months, kidney function, and urine cultures

### POSSIBLE COMPLICATIONS

- Depend on type of disease (nasal or widespread [disseminated])

### EXPECTED COURSE AND PROGNOSIS

- Widespread (disseminated) disease in dogs—prognosis is poor, especially in the German shepherd dog

## Key Points

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# Notes

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