

## **Description of Pythiosis**

Pythium is a genus of parasitic oomycetes. They are commonly called water moulds. The genus Pythium consists of about 200 species and are common pathogens causing disease in plants and fish. Pythium insidiosum is the only species which causes infection in animals.

Pythium insidiosum, the etiological agent of pythiosis insidiosii, causes life-threatening infections in animals. The disease most commonly infects horses and dogs, but can also infect cats, cattle, equines, captive polar bears and humans.

Pythiosis has frequently been reported in tropical and subtropical regions of the world. In the United States, the disease is more common in states along the Gulf of Mexico and East coastal areas, but can also occur in cooler and dryer areas of the U.S. as well.

Pythium insidiosum, like other Pythium spp, need wet environments to carry out their life cycle in nature. Pythiosis occurs primarily in the fall and early winter after warm summer months, especially after periods of high precipitation. Animals exposed to warm, standing water are more likely to encounter the infectious zoospores and may have an increased risk for the disease; however, the infection can be acquired after contacting moist soil and grass.

It is suspected that the invading zoospores enter an animal through open wounds, either in the skin or in the gastrointestinal tract. Water lilies and other aquatic plants and submerged grasses, including rice plants, are thought to be normal hosts. The zoospores have a strong attraction for hair, water-lily, and grass leaves.

Young dogs are most often affected, with several breeds such as the Labrador Retriever, German Shepherd and the Cavalier King Charles being seen most often.

## **Symptoms of gastrointestinal Pythiosis**

Canine gastrointestinal Pythiosis is an infection of the dog's digestive tract which causes the intestinal tract to thicken. Dogs may eventually develop an intestinal obstruction or large palpable abdominal mass.

Symptoms include: vomiting, diarrhea, loss of appetite, lethargy, weight loss, occasional fever, abdominal mass, and enlarged lymph nodes.

The stomach and duodenum are the most common sights of infection. Stomach lesions may be accompanied by abdominal pain and "coffee ground" vomitus due to ulceration and gastric bleeding. When the small intestines are affected, chronic diarrhea is more common. With colonic involvement and ulceration there may be bloody diarrhea.

Formation of hard gastrointestinal tumor-like masses and areas of thickness and mucosal ulceration are common. The infection may spread to adjacent tissue such as pancreas and mesenteric lymph nodes.

Histopathologically, the mucosa shows ulceration, atrophy, and hyperplasia. Eosinophils, plasma cells, macrophages, epithelial cells and giant cells are detected in infected tissues. The hyphae of *P. insidiosum*, however, are difficult to detect. Silver stain or other special stains are required to visualize the hyphae of this pathogen in infected tissue.

### **Symptoms of cutaneous Pythiosis**

The cutaneous or subcutaneous form of Pythiosis is acquired through an open wound which usually allows infiltration of the infective zoospores. Lesions are often located on the tail near the perineal area, legs, thorax, abdomen, and face.

Symptoms include swollen, non-healing wounds with pus-filled nodules and draining sinus tracts that often enlarge rapidly.

The hard stony masses (kunkers) seen in horses is not observed in dogs with the disease, but there will be areas of tissue death or necrosis with eosinophils and a moderate number of neutrophils and macrophages. The hyphae of *P. insidiosum* are found in the center of eosinophilic micro abscesses.

### **Canine Lagenidiosis**

The clinical presentation of canine lagenidiosis is nearly identical to that of the cutaneous form of pythiosis as the tumor like masses of lagenidiosis are identical in appearance to those of pythiosis. In contrast to the clinical course of cutaneous pythiosis, dogs with lagenidiosis often have involvement of distant sites.

It causes lesions in the legs, mammary glands, trunk, groin or near the tail. The notable difference in these diseases is that lagenidiosis disseminates to other organs much more commonly. Spontaneous dissemination of disease may involve the lungs, aorta or vessels, cranial mediastinum, and lymph nodes. An aneurysm of a great vessel can rupture and cause sudden death.

### **Diagnosis**

Because *P. insidiosum* lesions progress rapidly a quick diagnosis is essential for animal survival. Most veterinary practitioners are not aware of the disease, nor of the blood test, so recognition is important. The diagnosis of oomycete infections can be difficult due to clinical and histological similarity to fungal infections.

Special expertise is required for diagnosis by biopsies, so diagnosis is difficult because the organism requires warm temperatures to thrive. On biopsy you need a trained eye and special stain to identify the

hyphal structures of the organism, and it can take considerable time for these special laboratory procedures.

Abdominal radiographs in dogs with gastrointestinal pythiosis may show an intestinal blockage, intestinal wall thickening or defect, and/or abdominal mass. An ultrasound image of the dog's abdomen will tend to show thickening of the wall of the stomach or intestines. Enlarged lymph nodes may be evident due to the infection.

A complete blood count may be normal or have a slightly higher white blood cell count due to the infection, but will not show a *P. Insidiosum* infection. Only

two labs specialize in a serological test employing ELISA (Enzyme-Linked Immunosorbent Assay) technology to detect antibodies to *P. Insidiosum*, Louisiana State University and PavLab.

**Contact PavLab to diagnose Pythiosis and Lagenidiosis with a blood test at 800-856-9655.**

### **Treatment of Pythiosis**

The sooner you take your dog for treatment the better the prognosis, as the lesions are very aggressive and can overwhelm the dog's system in a matter of months. Unfortunately, even with treatment, most cases of pythiosis are fatal.

The most effective treatment regimens include a combination of anti-fungals and immunotherapy and sometimes surgery if that is possible considering where the infection is located.

Most vets will attempt to remove the infected tissue surgically if it is located in area that will allow resection with appropriate margins. Surgical removal is not always possible and does not always completely remove all infected tissues, so anti-fungals are usually recommended after surgery.

Since *P. Insidiosum* is not a true fungus, anti-fungal drugs alone will not completely eliminate the infection. Anti-fungals are also very expensive and can eventually cause liver toxicity. The anti-fungals used most often are: Sporonox, Itraconazole, Terbinafine, Fluconazole, Amphotericin B, Ketoconazole.

Sometimes your vet will prescribe a corticosteroid such as prednisone to reduce swelling and inflammation. This will immediately make your dog feel better and will help to help increase appetite which is another important aspect in treating this disease. Nutrition is a very important part of the treatment regimen in order to boost the immune system. Real foods are the best way in which to do this. (For feeding directions and a list of foods which will help boost the dog's immune system click [here](#).)

The newest treatment now being recommended by many vets is an immunotherapeutic vaccine which is USDA approved for treating Pythiosis in dogs. As soon as your dog is diagnosed, it should be vaccinated with the immunotherapy injections to help the dog's own immune system fight the infection. This will immediately reduce the size of the lesions and give the dog a better chance of survival.

**Contact PavLab for the USDA approved Immunotherapy treatment at 800-856-9655.**

### **Living and Management**

Your veterinarian will schedule follow up visits to determine the effectiveness of treatment and manage care afterwards. Abdominal x-rays and ultrasounds can also be done to re-evaluate intestinal signs of disease.

Additional blood tests which include the ELISA tests for Pythiosis are recommended. A chemical blood profile should be done as well to monitor liver toxicity if the dog is on anti-fungals.

Surviving dogs are recommended to receive a yearly booster vaccine to continue in a successful recovery from Pythiosis.