

# INTERSTITIAL PNEUMONIA

## BASICS

### OVERVIEW

- “Interstitial” relates to spaces within tissues or organs; the “interstitium” is the small narrow space or gap between tissues or parts of an organ
- “Pneumonia” is inflammation of the lungs
- Interstitial pneumonia is a form of pneumonia in which the inflammatory process occurs in the walls or interstitium of the alveoli
- The alveolus (plural, alveoli) is the terminal portion of the airways, in which oxygen and carbon dioxide are exchanged

### SIGNALMENT/DESCRIPTION of ANIMAL

#### Species

- Dogs and cats

#### Breed Predispositions

- Canine distemper virus infection—greyhounds, Siberian huskies, Weimaraners, Samoyeds, and Alaskan malamutes
- Interstitial lung disease is recognized most commonly in West Highland white terriers, and possibly white Cairn terriers and bull terriers
- *Pneumocystis carinii* is a protozoa that causes lung disease—miniature dachshunds

#### Mean Age and Range

- Canine distemper virus infection is most common in puppies 3 to 6 months of age
- Interstitial lung disease is recognized most commonly in middle- to old-age West Highland white terriers
- *Pneumocystis carinii*—miniature dachshunds less than 1 year of age at risk
- Endogenous lipid pneumonia is a type of interstitial pneumonia characterized by the presence of macrophages (types of cells that scavenge and clear bacteria and foreign substances out of body tissues) containing lipids (a group of compounds that contain fats or oils) that originated from breakdown of lung tissue and/or blood; it most commonly affects older cats
- Feline idiopathic pulmonary fibrosis-like conditions are characterized by excessive fibrous or scar-type tissue as part of a reactive process in the lungs; these conditions are of unknown cause and are therefore called “idiopathic;” they typically are seen in middle-aged to older cats
- Toxoplasmosis most commonly affects middle-aged cats

#### Predominant Sex

- Toxoplasmosis most commonly affects male cats

### SIGNS/OBSERVED CHANGES in the ANIMAL

- Depend on severity of disease
- Rapid breathing (known as “tachypnea”); coughing; difficulty breathing (known as “dyspnea”); standing with the elbows away from the body in an attempt to increase lung capacity (known as “orthopnea”); bluish discoloration of the skin and moist tissues (mucous membranes) of the body caused by inadequate oxygen levels in the red-blood cells (known as “cyanosis”); open-mouth breathing; exercise intolerance; abnormal breath sounds on listening to the lungs with a stethoscope (known as “auscultation”); possible spitting up blood from the lungs (known as “hemoptysis”)
- Mild fever and discharge from the eyes and/or nose often are present with canine adenovirus-2 infection
- Gastrointestinal signs; fever; discharge from the eyes and/or nose; thickening of the skin (known as “hyperkeratosis”) of the footpads; nervous system deficits; and twitching or contraction of a group of muscles (known as “myoclonus”) may be seen with canine distemper virus infection
- Animals with paraquat toxicity often have vomiting, diarrhea, and ulcers in their mouths and throats; they may produce only small amounts of urine (known as “oliguria”); excessive excitability and nervous system signs may be seen in the early phase of poisoning
- Inflammation of the retina (the back part of the eye, condition known as “retinitis”); inflammation of the iris and other areas in the front part of the eye (known as “uveitis”); nervous system signs, and/or gastrointestinal signs with toxoplasmosis

## CAUSES

### Congenital (present at birth)

- Bronchiolitis obliterans—organizing pneumonia (“BOOP”) is characterized by inflammation of the bronchioles (small airways) and surrounding tissue; the inflammation partially obliterates or closes the airway; it has been described secondary to an inherited disorder in which the normal secretion clearance mechanism of the lungs is defective (known as “primary ciliary dyskinesia”); defective development of the bronchi (known as “bronchial dysgenesis”) may lead to endogenous lipid pneumonia (a type of interstitial pneumonia characterized by the presence of macrophages [types of cells that scavenge and clear bacteria and foreign substances out of body tissues] containing lipids [a group of compounds that contain fats or oils] that originated from breakdown of lung tissue and/or blood) in the cat

### **Metabolic**

- Inflammation of the lungs, associated with uremia (excess levels of urea and other nitrogenous waste products in the blood; condition is known as “uremic pneumonitis”), possibly in association with BOOP; liver disease; or inflammation of the pancreas (known as “pancreatitis”) in cats

### **Cancer**

- Cancer may lead to long-term (chronic) dilation of bronchi or bronchioles, as a consequence of inflammation or blockage of the airway (known as “bronchiectasis”) or to BOOP
- Lung cancer (known as “pulmonary carcinoma”) is associated with the development of excessive fibrous or scar-type tissue as part of a reactive process (pulmonary fibrosis) in the lungs of cats

### **Idiopathic (unknown cause)**

- Pulmonary interstitial fibrosis (excessive fibrous or scar-type tissue as part of a reactive process in the lungs) and desquamative interstitial pneumonitis, a condition in which macrophages (types of cells that scavenge and clear bacteria and foreign substances out of body tissues) are found in the alveoli; some cases of endogenous lipid pneumonia; BOOP; primary pulmonary alveolar proteinosis (“PAP;” condition in which the alveoli fill with a protein-containing material)

### **Inflammatory**

- Endogenous lipid pneumonia (a type of interstitial pneumonia characterized by the presence of macrophages [types of cells that scavenge and clear bacteria and foreign substances out of body tissues] containing lipid [a group of compounds that contain fats or oils] that originated from breakdown of lung tissue and/or blood) is seen most commonly in cats with inflammation of the bronchi (known as “bronchitis”) and long-term (chronic) dilation of bronchi or bronchioles, as a consequence of inflammation or blockage of the airway (bronchiectasis) or inflammation of the bronchioles characterized by tissue death (known as “necrotizing bronchiolitis”); pulmonary interstitial fibrosis most likely occurs secondary to immune stimulation and/or immune-complex deposition

### **Infectious**

- Dogs—canine distemper virus, canine adenovirus-2, *Leishmania chagasi*, *Pneumocystis carinii*, *Angiostrongylus vasorum*, *Toxoplasma*
- Cats—*Toxoplasma*, feline immunodeficiency virus (FIV)

### **Toxic**

- Inhalation of dusts, gases, or vapors, thiacetarsemide (drug used in the treatment of heartworm disease), aspiration of petroleum-based products in cats, secondary pulmonary alveolar proteinosis (condition in which the alveoli fill with a protein-containing material), paraquat toxicity, silica dust (leading to “silicosis”), asbestos (leading to “asbestosis”)

### **Vascular (involving the blood vessels)**

- Blood clots to the lungs (thromboembolism); parasite larvae circulating in the lungs (known as “larval migrans”)

## **TREATMENT**

### **HEALTH CARE**

- Inpatient care, oxygen therapy, and monitoring for animals with evidence of severe breathing difficulties (known as “respiratory distress”)
- Minimize exposure to house dust, vapors, chemical fumes, or tobacco smoke
- Humidification of the inspired air (using a nebulizer or vaporizer) to liquefy secretions
- Pulmonary alveolar proteinosis (PAP)—therapeutic flushing of the bronchi, bronchioles, and alveoli (known as “bronchoalveolar lavage”) to remove the protein-containing material

### **ACTIVITY**

- Exercise restriction for animals with increased breathing effort
- Use a harness, rather than a restraint collar

### **DIET**

- Weight loss is indicated, if obese

## **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.

- Antibiotics should be used, as indicated by results of bacterial culture and sensitivities
- Inhaled steroids (such as [fluticasone](#)) or drugs to enlarge the bronchi and bronchioles (known as “bronchodilators,” such as [terbutaline](#)) can be beneficial in animals that require anti-inflammatory drugs
- Drugs to enlarge the bronchi and bronchioles (bronchodilators) might be helpful: sustained release [theophylline](#), [terbutaline](#)
- *Angiostrongylus vasorum*—[levamisole](#), with or without [aspirin](#) or steroids; alternative therapies include [fenbendazole](#), [mebendazole](#), and [ivermectin](#)
- BOOP—steroids ([prednisone](#)) have been used with clinical success in one case report

- Idiopathic pulmonary fibrosis—no effective therapy available; may try anti-inflammatory steroid therapy with [prednisolone](#) and drugs to enlarge the bronchi and bronchioles (bronchodilators), with or without drugs to control cough (known as “antitussives”) or antibiotics, if indicated
- *Leishmania chagasi*—[meglumine antimonite](#) or [sodium stibogluconate](#)
- Paraquat toxicity—induce vomiting and administer activated charcoal, if recent ingestion is known; supportive care, increase production of urine (known as “diuresis”) using furosemide, a diuretic; oxygen therapy as needed; consider use of drugs to decrease the immune response (known as “immunosuppressive drugs”), such as [dexamethasone](#), [cyclophosphamide](#), [nicotinamide](#), [superoxide dismutase](#), and [vitamin A](#)

## FOLLOW-UP CARE

### PATIENT MONITORING

- Observe response to therapy
- Repeat physical examination and listen to the lungs with a stethoscope (auscultation), chest X-rays, laboratory tests, and arterial blood-gas analysis (to evaluate the levels of oxygen and carbon dioxide in the blood), as indicated

### PREVENTIONS AND AVOIDANCE

- Avoid proximity to toxic fumes or paraquat (not legally sold in the United States)
- Vaccinate and deworm animals as recommended
- Appropriate insect control

### POSSIBLE COMPLICATIONS

- Secondary lung infections are common with most forms of interstitial pneumonia

### EXPECTED COURSE AND PROGNOSIS

- Guarded prognosis with *Pneumocystis carinii*, *Toxoplasma*, *Angiostrongylus vasorum*, canine adenovirus-2, canine distemper virus, *Leishmania chagasi*, and endogenous lipid pneumonia
- Poor long-term prognosis with idiopathic pulmonary fibrosis (mean survival time from the beginning of clinical signs: 17 months)
- Poor prognosis with clinical feline immunodeficiency virus (FIV) infection and uremic pneumonitis
- Paraquat toxicity is commonly fatal in dogs

## KEY POINTS

- Interstitial pneumonia is a form of pneumonia in which the inflammatory process occurs in the walls or interstitium of the alveoli
- The alveolus (plural, alveoli) is the terminal portion of the airways, in which oxygen and carbon dioxide are exchanged

