



International Journal of Veterinary Sciences and Animal Husbandry



ISSN: 2456-2912

NAAS Rating (2025): 4.61

VET 2025; 10(12): 592-597

© 2025 VET

www.veterinarypaper.com

Received: 20-10-2025

Accepted: 23-11-2025

David Karunyakaran H

Ph.D. Scholar, Department of
Veterinary Clinical Medicine,
Madras Veterinary College,
Tamil Nadu Veterinary and
Animal Sciences University,
Chennai, Tamil Nadu, India

Update on canine bronchial and pulmonary disorders

David Karunyakaran H

DOI: <https://www.doi.org/10.22271/veterinary.2025.v10.i12i.2897>

Abstract

Canine bronchial and pulmonary disorders represent a significant proportion of respiratory diseases encountered in veterinary clinical practice, particularly in adult and geriatric dogs. This review provides an updated overview of three major lower respiratory tract conditions in dogs: canine chronic bronchitis, bacterial pneumonia, and canine idiopathic pulmonary fibrosis. Canine chronic bronchitis is characterized by persistent neutrophilic airway inflammation, mucus hypersecretion, and airway remodeling, leading to chronic cough and progressive airflow limitation. Bacterial pneumonia arises from diverse etiologies including aspiration, infectious respiratory disease complexes, foreign bodies, nosocomial infections, and immune dysfunction, often presenting with variable clinical severity. Canine idiopathic pulmonary fibrosis, predominantly affecting West Highland white terriers, is a progressive and fatal interstitial lung disease marked by irreversible fibrosis and respiratory failure. The review highlights current understanding of pathophysiology, clinical presentation, diagnostic approaches—including imaging, airway sampling, and emerging biomarkers—and contemporary management strategies for these disorders. Emphasis is placed on the challenges of diagnosis, the importance of addressing underlying risk factors, and recent advances in diagnostic imaging and supportive therapies. Improved awareness and early recognition of these conditions are essential to optimize patient outcomes and quality of life in affected dogs.

Keywords: Canine chronic bronchitis, bacterial pneumonia, canine idiopathic pulmonary fibrosis

Introduction

Canine chronic bronchitis (CCB) is a persistent inflammatory disease of the lower airways that primarily presents with coughing and can progress to exercise intolerance and difficulty breathing. The severity of clinical signs varies widely among affected dogs, ranging from mild cases with manageable cough to severe cases where relentless coughing may lead to death or euthanasia. Dogs may appear otherwise healthy when not actively coughing, and while cough suppressants can reduce symptoms, they often cause sedation, affecting the dog's quality of life.

Chronic Bronchitis in Dogs

Coughing is a sudden, often noisy expulsion of air aimed at clearing the airways. However, other respiratory sounds such as reverse sneezing, stridor (a high-pitched sound from upper airway obstruction), and stertor (snoring-like noise) can sometimes be mistaken for cough. Dogs with conditions like tracheal collapse often produce a distinctive “honking” sound, which is frequently misclassified as cough.

Many small-breed dogs have their coughs accepted as normal by their owners, delaying veterinary evaluation until the disease is advanced. Chronic bronchitis in dogs is formally defined as a cough present on most days for at least two months, after ruling out other causes such as infections. Moreover, CCB can coexist with other cardiopulmonary disorders including mitral valve disease, tracheal collapse, and bronchomalacia, and in some cases may contribute to pulmonary hypertension. There is an ongoing debate among veterinary specialists on whether pulmonary hypertension in these dogs is a direct consequence of chronic bronchitis or is due to other concurrent diseases.

Corresponding Author:

David Karunyakaran H

Ph.D. Scholar, Department of
Veterinary Clinical Medicine,
Madras Veterinary College,
Tamil Nadu Veterinary and
Animal Sciences University,
Chennai, Tamil Nadu, India

Causes and Differential Diagnosis of Cough in Dogs

Aside from chronic bronchitis, several other conditions can cause coughing in dogs. Infectious diseases tend to cause cough in puppies or dogs exposed to many other dogs in places such as kennels or grooming facilities, but infections may also exacerbate chronic bronchitis in older dogs. Lung tumors—most often bronchial adenocarcinomas—and pleural effusion (fluid accumulation around the lungs) can also present with cough, with pleural effusion causing coughing through irritation or lung compression.

Upper airway diseases like laryngeal paralysis lead to intermittent aspiration of food or liquids, triggering coughing. In older dogs, laryngeal paralysis is frequently associated with swallowing difficulties (pharyngeal dysfunction). Gastroesophageal reflux, a common cause of cough in humans, also appears to have a connection to respiratory disease in dogs, especially brachycephalic breeds. Interstitial lung diseases generally produce rapid breathing and exercise intolerance but can also be associated with cough. Although congestive heart failure primarily causes increased breathing rates rather than coughing, some dogs do exhibit dry cough, possibly due to airway inflammation or collapse.

Clinical Evaluation of a Dog with Chronic Cough

A careful history and physical examination are essential. Chronic bronchitis is more common in older dogs, with cocker spaniels reported more frequently developing related bronchiectasis (permanent airway dilation). Environmental exposures, including contact with other dogs or irritants like smoke and fragrances, should be considered. Detailed characterization of the cough—whether dry or productive, constant or intermittent—and its triggers (such as eating or exercise) helps differentiate underlying causes. Voice changes or reluctance to bark may indicate concurrent upper airway disease and possible microaspiration.

Physical examination focuses on the cardiopulmonary system and systemic signs like weight loss or lethargy. Lung auscultation varies, ranging from normal sounds to crackles or wheezes. The presence of a heart murmur should be noted, though chronic cough more often results from lung versus cardiac disease. Notably, dogs with chronic bronchitis often have a respiratory arrhythmia attributed to increased vagal tone. Gentle palpation of the trachea can elicit a cough, helping confirm true coughing versus other respiratory noises. Most affected dogs are otherwise systemically well and present mainly for persistent coughing.

Some dogs experience fainting episodes (syncope) associated with coughing, termed “cough-drop syndrome,” likely linked to vagal stimulation. This must be differentiated from syncope caused by pulmonary hypertension or arrhythmias.

Diagnostic Testing

Many tests can support diagnosis and rule out other causes of cough. Baseline blood work, including complete blood counts, chemistry profiles, and urinalysis, often appears normal in chronic bronchitis but is important to evaluate general health. Eosinophilia (increased eosinophils) in blood may suggest parasitic or allergic causes. Additional diagnostics such as heartworm antigen testing and faecal exams for parasitic larvae are recommended. Measurement of N-terminal pro-brain natriuretic peptide (NT-proBNP) levels help detect heart complications (e.g., congestive heart failure or pulmonary hypertension), guiding further cardiac evaluation.

Pulmonary function testing is widely used in humans to assess airflow abnormalities but is challenging to apply routinely in dogs due to equipment and cooperation requirements. Nonetheless, tests such as arterial blood gas analysis and the six-minute walk test (6MWT) offer practical assessments of lung function and exercise capacity in dogs. The 6MWT can even be performed by owners at home to monitor response to therapy.

Imaging and Airway Evaluation

Chest radiographs are vital, revealing signs such as bronchial wall thickening (visualized as “donuts” and “tramlines”), obesity, bronchiectasis, and hyperinflation. Radiographs help exclude pneumonia, congestive heart failure, tumours, pleural effusion, and interstitial lung disease. Fluoroscopy can visualize tracheal or bronchial collapse but is less useful unless airway collapse is suspected.

Advanced imaging techniques like computed tomography (CT) provide superior detail of the airways and are often used when available, frequently combined with bronchoscopy and airway sampling procedures.

Bronchoscopy allows direct visualization of the airways. Dogs with chronic bronchitis often show irregular, thickened, and hyperaemic airway mucosa, with excessive mucus and partial airway collapse especially during expiration. This supports the presence of bronchomalacia alongside chronic inflammation.

Airway Sampling and Microbiology

Samples obtained during tracheal washes or bronchoalveolar lavage help characterize inflammation and exclude infection. Cytology typically reveals neutrophil predominance, mucin accumulation, and sometimes bacteria (considered contaminants if intracellular bacteria are absent). A marked eosinophilic presence suggests parasitic infections or eosinophilic lung disease.

Bacterial infections are often secondary contributors to cough exacerbation, and their role in chronic bronchitis remains less defined. Detection of *Mycoplasma* spp may require PCR testing due to difficulty with culture. Pneumonia and systemic illness usually accompany more severe clinical signs such as fever and lethargy, differentiating them from chronic bronchitis.

Pathophysiology

There are multiple pathophysiological mechanisms leading to Canine Bronchitis.

CCB is characterized by neutrophilic inflammation, increased mucus production, bronchial wall thickening, and airway collapse—all contributing to airflow obstruction and persistent coughing. This inflammation perpetuates further lung damage and decline in respiratory function. Unlike humans, dogs generally lack bronchoconstriction in chronic bronchitis, and the underlying causative factors remain unclear.

Treatment Approaches

Treatment goals include reducing inflammation, suppressing cough, improving exercise tolerance, and preventing disease progression. Eliminating environmental irritants such as tobacco smoke, air fresheners, and other pollutants is critical. Weight loss should be aggressively pursued, as excess weight worsens respiratory symptoms and limits activity. Using a harness instead of a collar and minimizing excessive barking are helpful adjunctive measures.

Glucocorticoids are the cornerstone of therapy. Prednisone is typically used at an initial dose of 1-2 mg/kg/day and then gradually tapered to the minimum dose controlling symptoms. Alternate-day dosing reduces side effects. Inhaled corticosteroids, like fluticasone delivered via a spacer and mask, are increasingly popular due to fewer systemic effects but can be costly and require owner commitment.

Bronchodilators are frequently prescribed despite limited evidence for efficacy in dogs. Antibiotics are appropriate during exacerbations with suspected infection; doxycycline and azithromycin are preferred for their antimicrobial and anti-inflammatory properties.

Cough suppressants improve quality of life once inflammation is controlled. Opioids such as hydrocodone and butorphanol are most effective, though tolerance and sedation are concerns. Emerging therapies like gabapentin show promise but need further study.

Prognosis and Managing Persistent Cough

Chronic bronchitis is a progressive disease with no cure; however, appropriate treatment often improves signs and slows airway damage. Periodic relapses are common and usually require adjustments in medications. Owners should be prepared for some degree of persistent coughing. In cases of refractory cough, compliance should be assessed, and other diagnoses such as heart failure or pneumonia should be reconsidered. Temporarily increasing corticosteroid or cough suppressant dosing, or using antibiotics for bacterial colonization, may be necessary during flare-ups. Hospitalization with oxygen therapy might be warranted for severe cases.

Recent Advances and Challenges

Recent years have seen limited new research in canine chronic bronchitis. Notable developments include the difficulty in sourcing extended-release theophylline and heightened regulation on opioids, complicating chronic cough management. Studies investigating novel therapies like neurokinin-1 receptor antagonists (e.g., maropitant) indicated some reduction in cough but no effect on inflammation.

Diagnostic markers such as C-reactive protein may help identify infectious exacerbations, and immunological studies suggest allergic components in some dogs. Imaging studies have explored CT metrics for bronchial wall thickness, though differentiation from other lung diseases remains challenging.

Bacterial Pneumonia

Bacterial pneumonia is a prevalent clinical diagnosis among dogs exhibiting both acute and chronic respiratory issues. Its development often involves a complex interplay of viral infections, environmental factors, and subsequent bacterial or mycoplasmal infections.

Classification and Causes of Bacterial Pneumonia

Aspiration Pneumonia

Aspiration pneumonia arises from the inadvertent inhalation of substances such as gastric acid, oropharyngeal secretions, or ingested materials into the lungs. This form accounts for a significant share of bacterial pneumonia cases and is often associated with risk factors like oesophageal diseases, persistent vomiting, seizures, and laryngeal dysfunction. In healthy animals, anatomical and physiological mechanisms protect the airway during swallowing, including the closure of

the epiglottis and adduction of arytenoid cartilages. Disruption of these defences increases the risk of aspiration, leading to inflammation and bacterial colonization in the lungs.

The severity of aspiration injury depends on the nature and amount of material inhaled and how long before diagnosis interventions are made. Animals with normal airway reflexes often cough to limit the damage, whereas anesthetized or neurologically impaired animals may not and consequently develop more severe, diffuse lung pathology. Despite the use of cuffed endotracheal tubes during anaesthesia, aspiration can still occur. Preventative measures, such as using cisapride combined with proton-pump inhibitors during anaesthesia, have shown promise in reducing gastroesophageal reflux and may decrease the risk of aspiration pneumonia.

Infectious (Community-Acquired) Pneumonia

In dogs, community-acquired pneumonia often starts with viral infections of the upper respiratory tract caused by agents such as canine respiratory coronavirus, adenovirus, herpesvirus, pneumovirus, or parainfluenza virus. Although many infections resolve on their own, they can impair the immune defences of the host and predispose to secondary bacterial infections. Bacterial pathogens frequently implicated include various *Streptococcus* species (notably *S. equi subsp. zooepidemicus* and *S. canis*), *Mycoplasma cynos*, and *Bordetella bronchiseptica*.

This complex—formerly known as kennel cough but now termed canine infectious respiratory disease complex (CIRD)—is especially prominent in environments where dogs are stressed and housed densely, such as shelters and kennels. Some bacterial strains, such as certain *S. equi subsp. zooepidemicus* isolates, have been linked to severe, often fatal pneumonias and may harbour resistance to commonly used antibiotics.

Foreign Body Pneumonia

Inhalation of foreign bodies, especially grass awns or plant material, introduces mixed bacterial and fungal organisms into the lungs, often causing localized pneumonia that initially responds to antibiotics but tends to relapse after treatment stops. Predisposed animals are typically young, sporting breeds exposed to environmental grass awns, and present with recurrent respiratory symptoms and focal changes on imaging. Notably, normal thoracic radiographs do not exclude the presence of airway foreign bodies; even CT scanning might fail to detect them in some cases. Chronic foreign material retention leads to severe inflammation and bronchiectasis, which should raise suspicion during radiographic evaluations.

Nosocomial and Ventilator-Associated Pneumonia

Hospital-acquired pneumonia, particularly ventilator-associated pneumonia (VAP), is increasingly recognized in veterinary patients. Mechanical ventilation and compromised respiratory tracts in critically ill animals promote colonization by resistant bacterial strains, leading to tracheobronchitis and pneumonia. Although less extensively studied in veterinary medicine, evidence suggests ventilated dogs are more likely to harbour multidrug-resistant organisms, paralleling human healthcare challenges. Recent outbreaks linked to contaminated anaesthesia equipment underscore the importance of strict infection control measures in veterinary hospitals.

Immune Dysfunction as a Risk Factor

Impairment of the immune system—whether congenital or acquired—is a significant risk factor for developing bacterial pneumonia. Deficiencies in innate immunity, such as primary ciliary dyskinesia or complement deficiencies, and adaptive immunity dysfunction, including immunoglobulin deficiency and retroviral infections (e.g., feline immunodeficiency virus), increase susceptibility. Moreover, immunosuppressive treatments, chemotherapy, and conditions causing prolonged recumbency or airway stasis further predispose animals to pneumonia. Young animals, with their relatively immature immune systems, are particularly vulnerable.

Clinical Signs and Physical Examination Findings

Presentation of bacterial pneumonia varies greatly depending on onset, severity, and chronicity. Early stages may only manifest as intermittent or soft cough, while progressive infection leads to persistent, productive cough, reduced exercise tolerance, loss of appetite, and lethargy. Respiratory patterns may change, including increased respiratory rate and effort, cyanosis, or difficulty breathing (orthopnoea). Lung auscultation might reveal subtle crackles or wheezes, sometimes only harsh lung sounds. Fever is inconsistent and thus unreliable as a diagnostic clue.

Diagnostic Evaluation

Laboratory Testing

A complete blood count frequently reveals an inflammatory leukogram with neutrophilia and possible left shift. However, lack of leukogram changes does not exclude pneumonia. Eosinophilia suggests alternative diagnoses such as parasitic infections or allergic diseases. Biochemical profiles, urinalysis, and parasitic screening complement the diagnostic picture by identifying systemic disease or concurrent infections.

Diagnostic Imaging

Thoracic radiographs remain a cornerstone in diagnosis, with pneumonia commonly presenting as alveolar or interstitial lung patterns. Aspiration pneumonia typically involves the ventral lung lobes, especially the right middle lung lobe. Radiographic signs can lag behind clinical illness; thus, normal imaging does not exclude early pneumonia. Three-view radiographs are preferred to improve diagnostic accuracy by preventing false negatives caused by positional changes. Advanced imaging such as CT offers superior resolution, enabling better visualization of bronchiectasis and foreign bodies, though the need for anaesthesia and associated risks limit its routine use.

Bronchoscopy and Airway Sampling

Bronchoscopy provides direct visual assessment of airway inflammation, mucus accumulation, and identification of foreign bodies. It allows collection of samples via bronchoalveolar lavage (BAL), which is preferred over tracheal wash due to higher diagnostic sensitivity. Cytologic examination reveals septic inflammation in bacterial pneumonia cases. Culture of lavage fluid identifies causative organisms and guides antimicrobial therapy. Multiple lavage sites should be sampled when foreign bodies are suspected to improve diagnostic yield.

Microbiology

Common bacterial isolates from affected dogs and cats include *Bordetella bronchiseptica*, *Escherichia coli*,

Klebsiella sp., *Pasteurella sp.*, *Mycoplasma sp.*, *Streptococcus sp.*, *Staphylococcus sp.*, and various anaerobic bacteria. Polymicrobial infections may occur, especially with foreign bodies or aspiration events. The identification of multidrug-resistant strains is increasing, highlighting the importance of culture-directed therapy and antimicrobial stewardship.

Treatment Principles

Treatment strategies depend on disease severity and involve

- **Antimicrobial Therapy:** For mild cases, outpatient oral antibiotics are often adequate, while severe or hospitalized cases may require intravenous combinations. Therapy duration traditionally ranged from 3 to 6 weeks, extending beyond clinical cure, although recent data support shorter courses might suffice if clinical and radiographic resolution occur. Re-evaluation within 10–14 days of starting therapy is essential to assess response.
- **Supportive Care:** Hydration to enhance mucus clearance, nebulization with sterile saline, and coupage (manual percussion to mobilize secretions) are beneficial adjuncts. Supplemental oxygen is warranted in hypoxemic animals. Mucolytic agents like N-acetylcysteine may aid in reducing secretion viscosity, especially in cases with bronchiectasis, although use via nebulization is discouraged due to potential airway irritation. Cough suppressants are contraindicated as they impede clearance of infectious material.
- **Addressing Underlying Risks:** For aspiration pneumonia, treatment of underlying causes such as esophageal disorders or vomiting is mandatory. Strategies include upright feeding, low-fat diets, and antiemetic/prokinetic drugs like maropitant or ondansetron. Acid suppression therapy's role remains controversial due to conflicting effects on gastric pH and bacterial proliferation.

Prognosis

Prognosis varies widely, influenced by infection severity, immune status, virulence of pathogens, and presence of multidrug resistance. The majority of dogs and cats recover with appropriate treatment; however, multidrug-resistant and recurrent pneumonias carry a worse outlook. Infection control measures in veterinary hospitals are critical to reduce nosocomial infections.

Canine Idiopathic Pulmonary Fibrosis

Canine idiopathic pulmonary fibrosis (CIPF) is a severe and progressive interstitial lung disease predominantly affecting West Highland white terriers (WHWTs). With no known cure, CIPF steadily worsens over time and ultimately results in respiratory failure and death. This disease closely resembles idiopathic pulmonary fibrosis (IPF) in humans in many respects, and studies have increasingly highlighted the parallels, making CIPF a valuable spontaneous animal model for human IPF research.

IPF and CIPF are part of a broader category known as interstitial lung diseases (ILDs), which encompass a group of noninfectious, noncancerous disorders characterized by varying degrees of lung inflammation and fibrosis. In dogs, ILDs are less well documented than in humans, partly due to diagnostic challenges requiring comprehensive clinical evaluation, lung tissue biopsy, and expert multidisciplinary analysis. CIPF is classified within the idiopathic interstitial pneumonias (IIPs), a subset of ILDs where no clear cause is

identified. Specifically, CIPF in WHWTs is considered a familial fibrotic ILD, manifesting as chronic, progressive fibrosis that primarily targets the lung parenchyma.

While CIPF is chiefly described in WHWTs, other terrier breeds have occasionally been affected, although the similarity of their disease to CIPF remains unclear. Alternative terms such as chronic IPF, canine pulmonary fibrosis, or ILD in WHWTs are also used to describe this condition. The hallmark is a genetic predisposition coupled with unknown environmental or host factors resulting in fibrotic lung re-modeling restricted to the lungs.

Histopathological Features

Histologic examination of CIPF-affected lungs reveals two predominant patterns of fibrosis. Most WHWTs demonstrate diffuse, mature, uniform fibrosis within alveolar walls, varying in severity from mild to moderate. Additionally, many have multifocal areas of more intense, cellular, and less mature fibrosis marked by changes including alveolar epithelial proliferation, smooth muscle hyperplasia, abundant myofibroblasts, and honeycombing (cystic changes in lung tissue). These more accentuated fibrotic regions tend to abut bronchioli or are located subpleurally.

Comparatively, CIPF shares features of both human usual interstitial pneumonia (UIP), the defining histologic pattern of human IPF, and nonspecific interstitial pneumonia (NSIP). The diffuse uniform fibrosis resembles NSIP, while the severe focal accentuations resemble UIP. Unlike in human UIP where fibroblast foci are distinct hallmarks indicating active fibrosis, canine myofibroblasts are dispersed throughout the interstitium.

Pathogenesis and Etiology

As an idiopathic disorder, CIPF's precise cause remains elusive, though recent hypotheses suggest that repetitive injury to the distal lung parenchyma triggers an aberrant wound healing process. Dysfunction of alveolar epithelial cells plays a pivotal role by undergoing increased apoptosis, abnormal repair, and hyperplasia. These epithelial cells release pro-fibrotic mediators such as transforming growth factor-beta (TGF- β), cytokines, and chemokines that stimulate fibroblast proliferation and recruitment.

The fibrotic cascade involves epithelial-to-mesenchymal transition, coagulation cascade activation enhancing fibrosis, and accumulation of fibroblasts and myofibroblasts that excessively deposit collagen and extracellular matrix. In humans, known risk factors include cigarette smoking, environmental exposures, gastroesophageal reflux causing microaspiration, and chronic viral infections; however, studies in dogs have not found herpesvirus involvement. Epidemiological surveys suggest that environmental factors like living in poorly ventilated older homes and frequent use of grooming facilities may increase CIPF risk in WHWTs. Detection of bile acids in bronchoalveolar lavage fluid points toward microaspiration due to gastroesophageal reflux as a plausible predisposing factor.

Genetics strongly influences CIPF, evidenced by breed predisposition and familial clustering in WHWTs, although specific causative mutations remain unidentified. Increased serum TGF- β in WHWTs further implicates this mediator in CIPF pathogenesis, consistent with its known profibrotic role.

Signalment and Clinical Manifestations

CIPF primarily affects middle-aged to older WHWTs, typically presenting between 8 to 13 years, although younger

cases have been reported. Unlike human IPF which shows male predominance, CIPF has no known sex bias. By diagnosis, many dogs already have advanced disease as the onset of clinical signs is insidious.

Typical clinical features include a chronic cough, exercise intolerance, abnormal breathing patterns characterized by use of abdominal muscles, and hypoxemia. Cyanosis, tachypnoea, orthopnoea (difficulty breathing lying down), and syncope can occur in advanced disease. Physical auscultation frequently reveals bilateral inspiratory "Velcro" crackles—sounds reminiscent of separating Velcro material—which are believed to arise from the sudden opening or closing of distorted alveoli and represent an early and specific sign of fibrosis. Some dogs may also exhibit wheezes or signs of pulmonary hypertension indicated by murmurs.

Diagnostic Evaluation

Diagnosis integrates breed, age, history, clinical examination, and advanced imaging. Definitive diagnosis usually requires histopathological confirmation of lung tissue, but lung biopsies are rarely performed due to invasiveness, thus CIPF diagnosis is often presumptive and confirmed at necropsy.

Conventional thoracic radiographs often reveal a broncho-interstitial pattern but lack sensitivity and specificity for CIPF, with subtle changes possibly masked by thick skin folds and early fibrotic changes. Radiographs are more important to rule out other causes like neoplasia.

High-resolution computed tomography (HRCT) is superior to radiography, often showing characteristic ground-glass opacities, mosaic attenuation, reticular lines, and occasionally traction bronchiectasis or honeycombing. These HRCT findings parallel those in human IPF and NSIP. Modified restraint devices allowing minimal sedation enhance accessibility of HRCT to assessed awake or lightly sedated dogs.

Bronchoscopy with bronchoalveolar lavage (BAL) can reveal bronchial mucosal irregularities, mucus accumulation, bronchomalacia, and tracheal collapse. BAL cytology typically shows increased cellularity with macrophages, neutrophils, and mast cells but seldom bacterial infection. Bronchoscopy and BAL are useful to rule out other airway diseases or infection when clinical data or imaging are inconclusive.

Biomarkers

Several candidate biomarkers have emerged to distinguish CIPF from healthy WHWTs and other respiratory diseases, including endothelin-1, procollagen type III amino-terminal propeptide, matrix metalloproteinases, and chemokines in serum and BAL fluid. Elevated serum TGF- β and interleukin-8 may underlie the breed's susceptibility. These markers hold promise for non-invasive diagnosis and possibly for prognostication but require further validation.

Treatment and Management

Currently, no curative treatments exist for CIPF. Human IPF treatments have shifted from anti-inflammatory to antifibrotic agents such as pirfenidone and nintedanib, which slow disease progression but do not reverse fibrosis. Pirfenidone's pharmacokinetics are known in dogs, but clinical use and safety remain unestablished. Nintedanib causes significant toxicity in dogs, limiting its potential.

Corticosteroids remain a common empirical therapy in CIPF dogs, often combined with theophylline which offers mild bronchodilation and enhances mucociliary clearance and

diaphragmatic function. Oral corticosteroids may be favoured given parallels with human NSIP treatment. Proton pump inhibitors are additionally considered to address potential microaspiration, analogous to human IPF management.

Pulmonary hypertension (PH) is a frequent and serious complication of CIPF, influencing mortality. PH evaluation via Doppler echocardiography guides treatment, often involving sildenafil though its benefit in this context is unclear.

Episodes of acute exacerbation, characterized by sudden respiratory deterioration, carry a grave prognosis akin to human IPF exacerbations and remain challenging to manage.

While long-term oxygen therapy is common in humans, its use in dogs is limited. However, maintaining regular gentle exercise and avoiding overexertion are encouraged to support quality of life.

Clinical Course and Prognosis

WHWTs with CIPF typically present at an advanced age with a median survival of around 11 months post-diagnosis and up to 32 months from the initial appearance of clinical signs. Disease progression varies individually; some dogs experience slow deterioration while others succumb rapidly, sometimes associated with acute exacerbations. Prognostic markers are limited but higher serum chemokine levels and severe CT changes correlate with worse outcomes.

Conflict of Interest

Not available

Financial Support

Not available

References

1. Johnson LR, Pollard RE. Tracheal collapse and bronchomalacia in dogs: 58 cases (7/2001-1/2008). *J Vet Intern Med.* 2010;24(2):298-305.
2. Rozanski E. Canine chronic bronchitis: an update. *Vet Clin North Am Small Anim Pract.* 2020;50(2):393-404.
3. Dear JD. Bacterial pneumonia in dogs and cats: an update. *Vet Clin North Am Small Anim Pract.* 2020;50(2):447-465.
4. Laurila HP, Rajamäki MM. Update on canine idiopathic pulmonary fibrosis in West Highland White Terriers. *Vet Clin North Am Small Anim Pract.* 2020;50(2):431-446.
5. Clercx C, Fastrès A, Roels E. Idiopathic pulmonary fibrosis in West Highland white terriers: an update. *Vet J.* 2018;242:53-58.
6. Reagan KL, Sykes JE. Canine infectious respiratory disease. *Vet Clin North Am Small Anim Pract.* 2020;50(2):405-418.
7. Day MJ, Carey S, Clercx C, Kohn B, Marsilio F, Thiry E, *et al.* Aetiology of canine infectious respiratory disease complex and prevalence of its pathogens in Europe. *J Comp Pathol.* 2020;176:86-108.

How to Cite This Article

Karunyakaran DH. Update on canine bronchial and pulmonary disorders. *International Journal of Veterinary Sciences and Animal Husbandry.* 2025;10(12):592-597.

Creative Commons (CC) License

This is an open-access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 International (CC BY-NC-SA 4.0) License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.