

Feline pulmonary histiocytic sarcoma associated with passive smoking in a 14-year-old neutered male cat

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ABSTRACT: Pulmonary histiocytic sarcoma is a rare, aggressive neoplasm associated with poor clinical outcomes in cats. This report describes a 14-year-old neutered male domestic cat who developed pulmonary histiocytic sarcoma after chronic exposure to secondhand tobacco smoke. The cat presented with persistent cough, inappetence, and progressive dyspnea. Diagnostic evaluation using thoracic radiography and cytological examination revealed neoplastic proliferation, consistent with histiocytic sarcoma. Despite supportive therapy, the cat's condition deteriorated, and euthanasia was elected because of grave prognosis. This case highlights the oncogenic impact of passive smoking on companion animals and the need for public awareness of smoke-free environments for pet health. Further studies are required to elucidate how environmental carcinogens, particularly tobacco smoke, contribute to cancer pathogenesis in domestic species.

Keywords:

feline histiocytic sarcoma, passive smoking, pulmonary neoplasm, environmental carcinogen

■ INTRODUCTION

Pulmonary histiocytic sarcoma (HS) is a rare and aggressive neoplastic disorder in cats that affects older individuals and involves multiple organs, including the spleen, liver, lungs, lymph nodes, and bone marrow (de Sousa *et al.*, 2019). The etiology and pathogenesis of feline pulmonary HS remain poorly defined owing to its low incidence and limited number of reported cases. Most studies have focused on histiocytic disorders of the spleen and lymph nodes, whereas pulmonary involvement remains poorly explored.

Environmental factors may contribute to neoplasia in companion animals with significant exposure to environmental tobacco smoke (ETS). Chronic inhalation or ingestion of smoke residues during grooming increases the risk of malignancies, such as lymphoma and oral squamous cell carcinoma in cats (Bertone *et al.*, 2003). Tobacco smoke contains carcinogens, such as polycyclic aromatic hydrocarbons, nitrosamines, and formaldehyde, which damage DNA and promote tumorigenesis (U.S. FDA, 2024).

While the carcinogenic effects of passive smoking are known for some feline cancers, its link to pulmonary histiocytic sarcoma is unexplored. This gap limits our understanding of the impact of environmental carcinogens on rare feline lung tumors. This report presents a case of feline pulmonary histiocytic sarcoma in a tobacco-exposed home, investigates the role of secondhand smoke in lung neoplasms, and stresses smoke-free environments for animal health within the One Health Framework.

■ CASE

Anamnesis and Signalment: A 14-year-old neutered male cat had been coughing for weeks with decreased appetite. No previous illnesses were noted. The cat lives indoors, where the owner smokes and is not regularly vaccinated. **Physical examination:** Rapid breathing with tracheal pinch showing non-productive cough reflex. No lymph nodes were palpable. Wheezing and crackles were present in both lungs. Other physical examination results were normal. **Diagnostic tests:** Blood tests were within normal limits, with glucose elevated at 181 mg/dL (normal 71-159 mg/dL). Radiographs were taken, as shown in Figure 1. **Treatments:** Discharged with antibiotic, bronchodilator, diuretic, and multivitamin for two weeks. After two weeks, the cat showed dyspnea, dehydration, and weight loss. Examination revealed decreased body score and muscle mass. The patient exhibited laborious breathing. Auscultation revealed increased lung and decreased heart sounds. Pleural effusion was confirmed by thoracic ultrasound, and thoracocentesis yielded 46 ml fluid, improving breathing. Fluid analysis showed transudate with 0.5 g/dL protein, 1.033 specific gravity, and negative rivalta test. Samples were sent for cytology. No masses were found on abdominal ultrasonography. Treatment continued with fluids and oxygen. The owner chose euthanasia due to poor prognosis.

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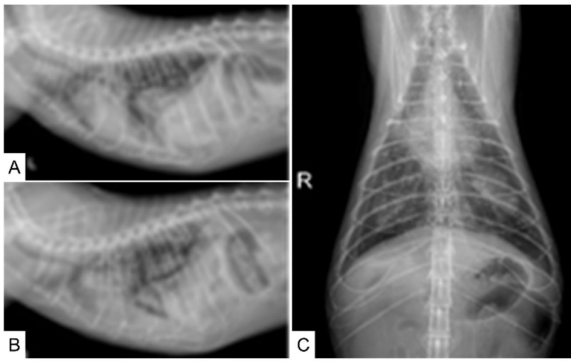


Figure 1. Thoracic radiographs of a cat with pulmonary abnormalities. Lateral (A) and ventrodorsal (B) views show a mixed pulmonary pattern comprising bronchial, alveolar, and structured/diffuse interstitial patterns, consistent with bronchopneumonia. Pleural effusion and tracheal collapse involving the distal one-third of the trachea are evident.

■ RESULTS AND DISCUSSION

The initial diagnostic approach for pulmonary neoplasia in cats involves thoracic radiography and cytological or histopathological confirmation (Argyle *et al.*, 2008). Cytological examination of the pleural fluid revealed a highly cellular specimen with predominantly lymphocytic inflammation, without clonal abnormalities. Scattered clusters and individual cells exhibited histiocytic features characterized by vacuolated cytoplasm and paracentral nuclei (Figure 2). These cells also displayed distinct cytological atypia, including binucleation, nuclear molding, coarse chromatin, multiple prominent nucleoli, anisocytosis, and anisokaryosis.

Atypical cells with histiocytic morphology have guided the diagnosis of feline pulmonary histiocytic sarcoma, histiocytic sarcoma, pulmonary Langerhans cell histiocytosis, or adenocarcinoma. Immunohistochemistry targeting CD18, E-cadherin, or MHC class II markers (Raskin *et al.*, 2023; Valenciano & Cowell, 2020) and FeLV/FIV serology (Zachary, 2022) are recommended. Tumorigenesis in cat's results from genetic predisposition and mutations disrupting cellular proliferation (Demirtas *et al.*, 2023). Environmental mutagens promote oxidative stress, leading to neoplastic transformation (Vail *et al.*, 2020). Cats may develop oral squamous cell carcinoma after exposure to tobacco carcinogens.

Primary pulmonary neoplasms in felines originate from epithelial or mesenchymal tissues (Zachary, 2022). Epithelial tumors—carcinomas and adenocarcinomas—are the most common and typically malignant (Henry & Higginbotham, 2010), while histiocytic sarcoma is the main mesenchymal lung tumor (Sharkey *et al.*, 2020; Valenciano & Cowell 2020). Affected cats often present with dyspnea, tachypnea, chronic coughing, lethargy, anorexia, and weight loss (Henry & Higginbotham, 2010). The prognosis of feline pulmonary neoplasia is poor. Surgical resection offers the best outcome for localized tumors, with an average survival of four months post-surgery, although some cats survive for two–three years with complete excision (Argyle *et al.*, 2008).

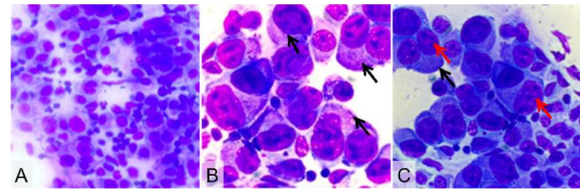


Figure 2. Cytological features of suspected feline pulmonary histiocytic sarcoma. (A) Cytology showing histiocytic cells in clusters and single cells with pleomorphism (Diff-Quick staining; 40× magnification). (B) A cellular smear of atypical cells with round nuclei and clear-to-basophilic cytoplasm with punctate vacuoles (black arrow). The binucleated forms showed eccentric or paracentric nuclei and variable cytoplasmic borders. (C) Multiple multinucleated cells (black arrow) and nuclear molding with coarse chromatin, prominent nucleoli (red arrow), anisocytosis, and anisokaryosis, consistent with malignancy (Diff-Quick staining, 100× magnification, oil immersion).

■ CONCLUSION

This case demonstrates a rare occurrence of feline pulmonary histiocytic sarcoma potentially associated with chronic exposure to secondhand tobacco smoke, underscoring the importance of maintaining smoke-free environments to safeguard companion animal health.

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